



VIASM

VIETNAM INSTITUTE FOR
ADVANCED STUDY IN MATHEMATICS

**HOẠT ĐỘNG KHOA HỌC
NĂM 2022**

ANNUAL REPORT 2022

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GIỚI THIỆU CHUNG

Năm 2022 là một năm đánh dấu nhiều sự kiện quan trọng đối với Viện Nghiên cứu cao cấp về Toán (VIASM). Nhiều văn bản pháp lý quan trọng của Viện cũng như của Chương trình trọng điểm quốc gia phát triển Toán học giai đoạn 2021-2030 (Chương trình Toán) đã được rà soát, điều chỉnh hoặc xây dựng mới. Trên đà hồi phục sau đại dịch Covid-19, VIASM đã nhanh chóng thích ứng, triển khai linh hoạt các hoạt động để hoàn thành vượt chỉ tiêu các nhiệm vụ được giao.

Trong năm, Viện tiếp tục tổ chức các nhóm nghiên cứu phối hợp giữa các chuyên gia trong và ngoài nước, tập trung trên các lĩnh vực thời sự được nhiều người quan tâm trong nhiều lĩnh vực toán lý thuyết lẫn toán ứng dụng như: Đại số - Lý thuyết số - Hình học - Tôpô; Giải tích; Phương trình vi phân và hệ động lực; Tối ưu và Tính toán Khoa học; Xác suất và Thống kê; Toán ứng dụng.

Năm 2022, số nghiên cứu viên đến Viện làm việc là 97 người, trong đó có 9 nghiên cứu viên sau tiến sĩ. Sau hai năm bị gián đoạn vì ảnh hưởng của đại dịch, từ cuối tháng 2/2022, các nghiên cứu viên đến từ các trường, viện nghiên cứu nước ngoài đã có thể đến làm việc tại Viện.

Viện đã tổ chức 7 hội nghị/hội thảo, 3 khóa học ngắn hạn và 4 trường chuyên biệt. Đây đều là các hoạt động khoa học chuyên sâu về các chủ đề Toán học thời sự. Đặc biệt, Viện đã phối hợp với Trung tâm quốc tế Vật lý lý thuyết Abdus Salam (ICTP) tổ chức thành công Trường hè về Lý thuyết nhóm và Lý thuyết Biểu diễn trong tháng 7/2022 với 5 chuỗi bài giảng của các chuyên gia hàng đầu thế giới. Viện Toán học Clay (Clay Mathematics Institute - CMI) cũng đồng hành cùng với VIASM và ICTP để tổ chức trường hè này. Tham dự trường hè có gần 80 học viên trực tiếp và trực tuyến, trong đó có 7 học viên đến từ Thái Lan, Indonesia, Philippin, Malaysia... được tài trợ đến Hà Nội tham dự trực tiếp. Đây cũng là hoạt động quốc tế có quy mô lớn đầu tiên (tính trên số lượng giảng viên và học viên nước ngoài tham dự) có thể tổ chức trực tiếp tại VIASM kể từ năm 2020. Tháng 8 năm 2022 cũng đã diễn ra Trường hè Mật mã do Hiệp hội Quốc tế về Nghiên cứu Mật mã phối hợp cùng Viện Nghiên cứu cao cấp về Toán tổ chức. Quỹ LIA For Math VN và một số trường đại học lớn của Pháp cũng đã tham gia tài trợ cho trường. Đây là một hoạt động quốc tế lớn, với sự tham gia giảng dạy của các nhà khoa học hàng đầu trong lĩnh vực nghiên cứu mật mã như GS. Damien Stehlé, GS. David Pointcheval, GS Phan Dương Hiệu, PGS. Triệu Ni, GS. Jian Guo ... Tới tham dự trường hè có hơn 80 học viên là sinh viên, học viên cao học, nghiên cứu sinh và nhà khoa học trẻ đến từ 12 quốc gia

trên thế giới: Việt Nam, Singapore, Nhật Bản, Thái Lan, Ấn Độ, Hoa Kỳ, Đức, Pháp, Philippines, Thổ Nhĩ Kỳ, Đan Mạch và Australia (trong đó có 25 học viên là người nước ngoài và người Việt Nam đang học tập, làm việc ở nước ngoài). Cũng trong khuôn khổ Trường hè, ngày Mật mã trong thực tế - Real World Crypto Day là nơi giới thiệu những ứng dụng thực tế nhất của các nghiên cứu Crypto với sự tham gia trình bày của nhiều chuyên gia lớn. Đây được coi là bước chuẩn bị để Việt Nam có thể tổ chức hội nghị Real-World Crypto của IACR trong tương lai gần.

Cũng vào cuối tháng 8, 2022, căn cứ Quyết định số 2436/QĐ-BGDĐT ngày 29/8/2022 của Bộ trưởng Bộ Giáo dục và Đào tạo, từ tháng 08-09/2022, Viện đã triển khai các hoạt động để phục vụ Hội đồng quốc tế đánh giá kết quả hoạt động của Viện giai đoạn 2016-2021. Hội đồng đánh giá cao các kết quả VIASM đạt được trong giai đoạn 2016-2021. Hội đồng khẳng định VIASM “*đã đóng vai trò then chốt trong việc nâng cao và đẩy mạnh hợp tác quốc tế tại Việt Nam*” và “*đã đạt được vị thế sau 10 năm thành lập là một trung tâm nghiên cứu có sức cạnh tranh ở tầm quốc tế, với tiềm năng rất lớn trong tương lai*”.

Ngày 30/8/2022, sau hơn 2 năm bắt đầu đưa vào sử dụng, **Lễ khánh thành trụ sở VIASM** đã được tổ chức thành công, với sự tham dự của nguyên Phó Thủ tướng Chính phủ Vũ Đức Đam, nguyên Phó Thủ tướng Chính phủ Nguyễn Thiện Nhân và đại diện Lãnh đạo Bộ Giáo dục và Đào tạo, Bộ Khoa học Công nghệ, đại diện lãnh đạo các Trường, Viện, các đơn vị có liên quan cùng các nhà Toán học trong và ngoài nước.

Viện đặc biệt chú trọng phát triển Toán ứng dụng trong năm 2022 với các hoạt động nổi bật như: Xây dựng mạng lưới thống kê ứng dụng và vận trù học, tổ chức thành công các hoạt động về blockchain, khoa học dữ liệu.

Các hoạt động hợp tác luôn được Viện quan tâm mở rộng, đặc biệt là các hoạt động kết nối Trường - Viện - Doanh nghiệp. Trong năm 2022, Viện NCCCT đã ký kết Thỏa thuận thành lập “**Phòng nghiên cứu quốc tế Việt – Pháp về Toán học và các ứng dụng**” (**IRL FVMA**) giữa Viện Hàn lâm Khoa học và Công nghệ Việt Nam (VAST), Trung tâm Nghiên cứu Khoa học Quốc gia Pháp (CNRS) và VIASM; thỏa thuận hợp tác với Trường Đại học Ngoại thương.

Trong khuôn khổ Chương trình Toán, Viện đã triển khai các nhiệm vụ được nêu tại Quyết định số 2200/QĐ-TTg ngày 22/12/2020 của Thủ tướng Chính phủ và đạt được nhiều kết quả đáng ghi nhận.

Ngày 30/03/2022, Bộ Tài chính đã ban hành Thông tư số 22/2022/TT-BTC hướng dẫn quản lý và sử dụng kinh phí chi thường xuyên thực hiện Chương trình trọng điểm quốc gia phát triển Toán học giai đoạn 2021-2030.

Ngày 30 tháng 12 năm 2022, Bộ trưởng Bộ Giáo dục và Đào tạo đã ban hành Quyết định số 4657/QĐ-BGDĐT ban hành Quy chế xét tặng Giải thưởng công trình Toán học xuất sắc thuộc Chương trình trọng điểm quốc gia phát triển Toán học giai đoạn 2021 đến 2030. Viện đang tiếp tục tích cực và chủ động phối hợp với các Vụ, Cục chức năng để xây dựng Quy chế làm việc của Ban Điều hành và Dự thảo các văn bản quy định tổ chức, triển khai và thực hiện các nhiệm vụ của Chương trình.

1. Tổ chức và nhân sự

1.1. Về tổ chức: Mô hình tổ chức của Viện bao gồm

- Ban Giám đốc: có nhiệm kỳ 03 năm;
- Văn phòng;
- Phòng nghiên cứu quốc tế Pháp-Việt về Toán học và ứng dụng (IRL FVMA).
- Phòng thí nghiệm Khoa học dữ liệu;
- Các nhóm nghiên cứu và cá nhân làm việc ngắn hạn: hàng năm được Hội đồng Khoa học của Viện tuyển chọn đến Viện làm việc.

1.2. Nhân sự

a) Ban Giám đốc hiện nay gồm 3 thành viên:

- Giám đốc khoa học: GS. Ngô Bảo Châu;
- Giám đốc điều hành: PGS. Lê Minh Hà;
- Phó Giám đốc: TS. Trịnh Thị Thúy Giang.

b) Văn phòng gồm 14 người, trong đó có 1 Phó Chánh Văn phòng, 1 Kế toán trưởng, 8 chuyên viên và 3 nhân viên.

2. Hội đồng khoa học

Hội đồng khoa học nhiệm kỳ 2021 - 2024 gồm 14 thành viên:

- GS. Ngô Bảo Châu, VIASM và ĐH Chicago (Mỹ);
- GS. Hồ Tú Bảo, VIASM;
- GS. Đinh Tiến Cường, ĐH Quốc gia Singapore;
- GS. Nguyễn Hữu Dur, Trường ĐH Khoa học Tự nhiên - ĐHQGHN;
- PGS. Lê Minh Hà, VIASM;

- GS. Phùng Hồ Hải, Viện Toán học - Viện Hàn lâm KHCNVN;
- GS. Lê Tuấn Hoa, Viện Toán học - Viện Hàn lâm KHCNVN;
- GS. Trần Vĩnh Hưng, ĐH Wisconsin-Madison (Mỹ);
- GS. Nguyễn Xuân Hùng, Viện Công nghệ CIRTECH - Trường ĐH Công nghệ TP.HCM;
- PGS. Vũ Hoàng Linh, Trường ĐH Khoa học Tự nhiên - ĐHQGHN;
- GS. Nguyễn Xuân Long, Đại học Michigan (Mỹ);
- GS. Phan Thanh Nam, Ludwig Maximilian University of Munich (Đức);
- PGS. Phạm Tiến Sơn, Trường ĐH Đà Lạt;
- PGS. Trần Văn Tấn, Trường ĐH Sư phạm Hà Nội;
- GS. Phạm Hữu Tiệp, ĐH Rutgers (Mỹ).

3. Ban Tư vấn quốc tế

- GS. Jean-Pierre Bourguignon, ĐH Bách khoa Paris (Pháp);
- GS. Robert Fefferman, ĐH Chicago (Mỹ);
- GS. Martin Grötschel, Học viện Khoa học và Nhân văn Berlin - Brandenburg (Đức);
- GS. Benedict Gross, ĐH Harvard (Mỹ);
- GS. Phillip Griffiths, Viện nghiên cứu cao cấp Princeton (IAS - Mỹ);
- GS. Madabusi Santanam Raghunathan, Viện Công nghệ Ấn Độ Bombay (IIT Bombay).

4. Cộng tác viên lâu dài

- GS. Hồ Tú Bảo, VIASM;
- TS. Nguyễn Hồng Đức, Trường ĐH Thăng Long;
- GS. Duc (David) Trần, ĐH Massachusetts, Boston (Mỹ);
- GS. Thomas Hales, ĐH Pittsburgh (Mỹ);
- GS. Phan Dương Hiệu, ĐH Limoges (Pháp);
- GS. Lê Tuấn Hoa, Viện Toán học, Viện Hàn lâm KHCNVN;

- TS. Vương Quân Hoàng, Trường ĐH Phenikaa;
- TS. Bùi Hải Hưng, Viện Nghiên cứu Trí tuệ nhân tạo, Tập đoàn Vingroup;
- PGS. Trần Vĩnh Hưng, ĐH Wisconsin Madison (Mỹ);
- PGS. Ngô Hoàng Long, Trường ĐH Sư phạm Hà Nội;
- GS. Nguyễn Xuân Long, ĐH Michigan (Mỹ);
- GS. Phan Thành Nam, ĐH Ludwig Maximilian, Munich (Đức);
- GS. Lionel Schwartz, ĐH Paris 13 (Pháp);
- GS. Phạm Hữu Tiệp, ĐH Rutgers (Mỹ);
- TS. Nguyễn Chu Gia Vượng, Viện Toán học, Viện Hàn lâm KHCNVN.

5. Trung tâm, Phòng Thí nghiệm

5.1. Phòng thí nghiệm Khoa học Dữ liệu (VIASM-DSLAb)

Sau gần 5 năm đi vào hoạt động, Phòng thí nghiệm Khoa học dữ liệu do GS. Hồ Tú Bảo phụ trách, với các thành viên tham gia từ một số trường đại học trên cả nước đã thực hiện nhiều hoạt động về nghiên cứu, đào tạo và tư vấn chính sách.

Hoạt động nghiên cứu

- DSLab tổ chức seminar thường kỳ hằng tháng, trình bày và trao đổi về những tiến bộ của trí tuệ nhân tạo, học máy và khoa học dữ liệu. Cùng với nỗ lực theo đuổi nghiên cứu tại trường viện của mình về AI và khoa học dữ liệu, những trao đổi thường xuyên giúp DSLab cùng nhìn nhận, nắm bắt các hướng phát triển mới của học máy và AI.
- Nghiên cứu của các thành viên tập trung vào machine learning và deep learning, với các nội dung về continual learning, deep generative models, deep learning theory, deep reinforcement learning, generative adversarial networks, graph network, big data analytics.
- Nghiên cứu ứng dụng chủ yếu về xử lý ngôn ngữ tự nhiên, cũng như khoa học dữ liệu trong y tế và kinh tế, với tập trung cho việc xây dựng các tài nguyên ngôn ngữ tiếng Việt, các phương pháp mới của deep learning cho xử lý ngôn ngữ như language models, chatbot, document analysis and recognition.

- Chủ trì tổ chức seminar chung về AI với tham gia của giáo viên, sinh viên, người làm nghiên cứu từ hơn ba mươi trường viện và doanh nghiệp trên cả nước với hình thức trực tiếp và trực tuyến. Seminar chung về AI mời các diễn giả uy tín từ nhiều nơi chia sẻ kết quả nghiên cứu cũng như giới thiệu các tiến bộ mới trong lĩnh vực AI. Seminar được tổ chức hằng tháng và đã thực hiện được 8 kỳ với các chuyên gia từ Mỹ, Canada, Úc, UK, Nhật Bản, Trung Quốc...
- Tổ chức hội nghị quốc tế lần thứ 25 về các vấn đề dữ liệu và đánh giá các hệ thống xử lý tiếng nói O-COCOSDA 2022, cùng với hội thảo lần thứ 9 về Xử lý tiếng Việt VLSP 2022.

Hoạt động giáo dục

- Hầu hết thành viên đều là những người xây dựng chương trình và phụ trách về đào tạo khoa học dữ liệu ở các trường của Đại học Quốc gia Hà Nội, Đại học Bách Khoa Hà Nội, Học viện Công nghệ Bru chính Viễn thông, trường Đại học Tôn Đức Thắng, trường Đại học Thủy lợi...
- Tham gia đào tạo và cải tiến chương trình Phân tích Kinh doanh của Trường Quốc tế thuộc Đại học Quốc gia Hà Nội.
- Tiếp tục giúp trường Đại học Ngoại thương xây dựng chương trình đào tạo mới “Kinh doanh số”, khai giảng tháng 10/2022.

Hoạt động tư vấn

- Tham gia xây dựng một số chiến lược quốc gia về kinh tế số và xã hội số, chiến lược dữ liệu, trung tâm dữ liệu quốc gia.
- Tư vấn và đào tạo về Chuyển đổi số cho một số địa phương và doanh nghiệp: Thái Nguyên, Thái Bình, Bắc Giang, Hải Phòng, Quảng Trị, Bình Thuận, Thành phố Hồ Chí Minh... tập đoàn Dầu khí Việt Nam, tập đoàn Than-Khoáng sản Việt Nam, tập đoàn VNPT, các khóa đào tạo cho các doanh nghiệp nhỏ và vừa...
- Tham gia tư vấn và giúp đỡ tiến hành Chuyển đổi số Giáo dục nghề nghiệp tại 11 trường cao đẳng trên cả nước, đặc biệt là việc đổi mới nội dung đào tạo.

5.2. Phòng nghiên cứu quốc tế Việt - Pháp về Toán học và ứng dụng

Theo thỏa thuận thống nhất giữa 3 bên - Viện Hàn lâm Khoa học và Công nghệ Việt Nam (VAST), Trung tâm Nghiên cứu Khoa học Quốc gia Pháp (CNRS) và Viện nghiên cứu cao cấp về Toán, ngày 26/8/2022 tại Hà Nội, Phòng nghiên cứu quốc tế Việt – Pháp về Toán học và ứng dụng” (International Research Laboratory France-Vietnam in Mathematics and its

Applications - IRL FVMA) đã được thành lập. Phòng nghiên cứu quốc tế sẽ chính thức đi vào hoạt động từ 1/1/2023, với trụ sở đặt tại Viện nghiên cứu cao cấp về Toán, là sự tiếp nối các hoạt động hợp tác toán học Pháp - Việt từ nhiều năm nay.

Ngày trong năm 2022, một số hoạt động của VIASM đã được tài trợ bởi quỹ LIA VN, tiền thân của IRL FVMA như trường hè mật mã và ứng dụng, khóa học mùa thu của GS. Christine Thomas-Agnan...

6. Cơ sở vật chất

Trụ sở mới của Viện tại 157 Phố Chùa Láng đã chính thức được đưa vào sử dụng một phần từ tháng 04/2020 (tháng 01/2021 mới hoàn thiện công trình), với tổng diện tích gần 2000 mét vuông. Năm 2022, công trình trụ sở của Viện đã đi vào hoạt động đồng bộ và ổn định, đáp ứng tốt các nhu cầu. Hiện nay, Viện đang trong quá trình triển khai và chuẩn bị tiếp nhận dự án “Tăng cường trang thiết bị và hạ tầng công nghệ thông tin phục vụ công tác chuyên đổi số nâng cao chất lượng đào tạo, giảng dạy và nghiên cứu cho Viện Nghiên cứu cao cấp về Toán”, dự kiến dự án hoàn thành thì Viện sẽ có một trụ sở đẹp, hiện đại, đáp ứng hoạt động của một viện nghiên cứu theo chuẩn quốc tế.

Trong năm 2022, Thư viện cung cấp các tài liệu khoa học có giá trị với hơn 1400 đầu sách, tạp chí nhằm phục vụ các nhà nghiên cứu, khách mời, các sinh viên đến học tập và làm việc tại Viện.

Các phần mềm quản lý đăng ký và xét tuyển nghiên cứu viên, thường công trình Toán học, đăng ký tham dự và tổ chức hội nghị/hội thảo đã được đưa vào sử dụng từ nhiều năm trước đáp ứng một số chức năng quản lý cơ bản của Viện. Bên cạnh đó, để đẩy mạnh chuyển đổi số và chuẩn bị cho các hoạt động của Chương trình Toán giai đoạn 2021-2030, trong năm 2022, Viện đã tiến hành xây dựng và nâng cấp, vận hành hệ tri thức số các nhà khoa học về Toán:

- Nâng cấp Website Chương trình Toán thành Cổng thông tin điện tử Toán học Việt Nam;

- Cập nhật Hệ thống giao bài tập và chấm điểm môn Toán (Webworks);

- Cơ sở dữ liệu các nhà toán học Việt Nam trong và ngoài nước: Tự động thu thập các công bố về Toán; Thu thập, quản lý và khai thác các thông tin của các nhà toán học; Hiện thị mạng lưới các nhà toán học Việt Nam.

Ngoài ra, Viện cũng đang trong giai đoạn thực hiện Quản trị, cập nhật Cổng thông tin điện tử toán học Việt Nam (website Chương trình toán và 03 website các định hướng Toán ứng dụng - Mạng lưới Vận trù học; Mạng lưới Thống kê ứng dụng; Trí tuệ nhân tạo và Khoa học dữ liệu).

7. Kinh phí

Tổng kinh phí NSNN năm 2022 giao cho Viện là 26.606 triệu đồng.

Trong đó:

- Kinh phí giao thực hiện các nhiệm vụ thường xuyên theo chức năng của Viện là 15.600 triệu đồng;

- Kinh phí giao thực hiện các nhiệm vụ của Chương trình trọng điểm quốc gia phát triển Toán học giai đoạn 2021-2030: 11.006 triệu đồng, gồm:

+ Kinh phí sự nghiệp Khoa học và Công nghệ cấp thực hiện các nhiệm vụ của Chương trình trọng điểm quốc gia phát triển Toán học giai đoạn 2021-2030 thực hiện năm 2022: 900 triệu đồng.

+ Kinh phí sự nghiệp Giáo dục và Đào tạo cấp thực hiện các nhiệm vụ của Chương trình trọng điểm quốc gia phát triển Toán học giai đoạn 2021-2030 thực hiện năm 2022: 10.106 triệu đồng.

CÁC NHÓM NGHIÊN CỨU VÀ HƯỚNG NGHIÊN CỨU

1. Nghiên cứu viên

Trong năm 2022 có 97 nghiên cứu viên được mời đến Viện làm việc, trong đó 88 nghiên cứu viên làm việc từ 2 tháng đến 6 tháng, 9 nghiên cứu viên sau tiến sĩ làm việc 12 tháng.

Trong số 97 nghiên cứu viên có 48 người từ Hà Nội và 25 người từ các tỉnh, thành phố khác; 78 người từ các trường đại học và 19 người từ các viện nghiên cứu; 14 là người Việt Nam ở nước ngoài và 10 người nước ngoài.

Danh sách 97 nghiên cứu viên và 10 khách mời năm 2022 của VIASM chi tiết tại trang 80-86.

2. Học viên

Năm 2022, có 12 học viên đến làm việc trong các nhóm nghiên cứu (thời gian từ 1 tuần đến 3 tháng). Trong đó, có 6 học viên từ Hà Nội, 4 học viên từ các tỉnh ngoài Hà Nội, 1 học viên người Việt Nam ở nước ngoài và 1 học viên người nước ngoài.

3. Nhóm nghiên cứu

Nhóm nghiên cứu là hình thức hoạt động chính của Viện. Thông qua việc quy tụ, kết nối các nhà khoa học trong nước, nhà khoa học Việt Nam ở nước ngoài và các nhà khoa học nước ngoài cùng đến làm việc tập trung tại VIASM, các nhóm nghiên cứu trong nước tiếp tục được phát triển các hướng nghiên cứu hiện tại, đồng thời ươm mầm cho những hướng nghiên cứu mới.

Trong năm 2022, Viện đã tổ chức cho 25 nhóm nghiên cứu và 14 cá nhân (nghiên cứu sau tiến sĩ) đến Viện làm việc theo 6 hướng sau:

- Đại số - Lý thuyết số - Hình học - Tô pô;
- Giải tích;
- Phương trình vi phân và hệ động lực;
- Tối ưu và Tính toán Khoa học;
- Xác suất và Thống kê;
- Toán ứng dụng.

Danh sách các nhóm nghiên cứu và các cá nhân, nghiên cứu viên sau tiến sĩ:

Đại số - Lý thuyết số - Hình học - Tô pô: 11 nhóm và 5 cá nhân

3.1. Nhóm của GS.TSKH. Phạm Ngọc Ánh nghiên cứu đề tài “*Vài vấn đề của đại số kết hợp*” gồm 3 thành viên:

- GS. TSKH. Phạm Ngọc Ánh, Viện Hàn lâm Khoa học Hungary;
- TS. Trịnh Thanh Đèo, Trường ĐH Khoa học Tự nhiên, ĐHQG TP.HCM (1 tháng);
- TS. Ngô Tấn Phúc, Trường ĐH Đồng Pháp (3 tháng)

làm việc 2.5 tháng (từ tháng 10/2022 đến tháng 12/2022).

3.2. Nhóm của TS. Đỗ Việt Cường nghiên cứu đề tài “*Về công thức vết Kuznetsov*” gồm 3 thành viên:

- TS. Đỗ Việt Cường, Trường ĐH Khoa học Tự nhiên, ĐHQGHN;
- TS. Đào Phương Bắc, Trường ĐH Khoa học Tự nhiên, ĐHQGHN;
- TS. Ngô Trung Hiếu, ĐH Bách khoa Hà Nội

làm việc 4 tháng (từ tháng 1/2022 đến tháng 4/2022).

3.3. Nhóm của TS. Nguyễn Hồng Đức nghiên cứu đề tài “*Tích phân mô-ti-vích, Hình học Líp-sít và Lý thuyết kì dị*” gồm 5 thành viên và 1 học viên:

- TS. Nguyễn Hồng Đức, Trường ĐH Thăng Long (3/2022 đến 7/2022);
- TS. Pablo Portilla Cuadrado, ĐH Lille, Pháp (1.5 tháng);
- TS. Nguyễn Xuân Việt Nhân, TT Toán học ứng dụng Basque, Tây Ban Nha (4 tháng);
- GS. Guillermo Peñafort Sanchis, ĐH València, Tây Ban Nha (1.25 tháng);
- PGS.TS. Lê Quý Thường, Trường ĐH Khoa học Tự nhiên, ĐHQGHN (4 tháng);
- TS. Trần Quang Tuệ, Trường ĐH Phenikaa (Học viên)

làm việc 4 tháng (từ tháng 3/2022 đến tháng 6/2022).

3.4. Nhóm của GS. Đinh Quang Hải nghiên cứu đề tài “*Cấu trúc đại số của mã constacyclic codes trên vành hữu hạn và ứng dụng*” gồm 7 thành viên, 1 khách mời và 5 học viên:

- GS. Đinh Quang Hải, ĐH Kent State, Mỹ;

- TS. Nguyễn Trọng Bắc, Trường ĐH Kinh tế và Quản trị Kinh doanh, ĐH Thái Nguyên (4 tháng);
- TS. Tushar Bag, Viện Công nghệ Ấn Độ;
- TS. Trần Hoài Ngọc Nhân, Trường ĐH Sư phạm Kỹ thuật Vĩnh Long (4 tháng);
- PGS. TS. Trương Công Quỳnh, Trường ĐH Sư phạm, ĐH Đà Nẵng (4 tháng);
- PGS. TS. Abhay Kumar Singh, Viện Công nghệ Ấn Độ;
- GS. Lê Văn Thuyết, Trường ĐH Sư phạm, ĐH Huế (4 tháng);
- TS. Han Mao Kiah, Trường KH Vật lý và Toán học, Singapore (Khách mời);
- Nguyễn Thị Diễm Chi, Trường THPT Phạm Phú Thứ (Học viên, 2 tháng);
- Trương Thị Hải Duyên, Trường ĐH Sư phạm Hà Nội 2 (Học viên, 2.25 tháng);
- Nguyễn Thị Nga, Trường ĐH Vinh (Học viên, 2.25 tháng);
- Đào Thị Trang, Trường ĐH Công nghiệp Thực phẩm TP.HCM (Học viên, 2.5 tháng);
- TS. Bhanu Pratap Yadav, Viện Công nghệ Ấn Độ (Học viên, 1.5 tháng)

làm việc 2 tháng (từ tháng 5/2022 đến tháng 7/2022).

3.5. Nhóm của TS. Trần Quang Hóa nghiên cứu đề tài “*Một vài tính chất đại số và các bất biến của đại số phân bậc chuẩn*” gồm 2 thành viên:

- TS. Trần Quang Hóa, Trường ĐH Sư Phạm, ĐH Huế;
- TS. Nguyễn Đăng Hợp, Viện Toán học, Viện Hàn lâm KHCNVN

làm việc 4 tháng (từ tháng 5/2022 đến tháng 8/2022).

3.6. Nhóm của PGS. TS. Nguyễn Ngọc Hưng nghiên cứu đề tài “*Lý thuyết biểu diễn và đặc trưng của nhóm hữu hạn*” gồm 3 thành viên:

- PGS. TS. Nguyễn Ngọc Hưng, ĐH Akron, Mỹ;
- TS. Hung P. Tong - Viet, ĐH Binghamton, Mỹ (1 tháng);
- TS. Bùi Anh Tuấn, Trường ĐH Khoa học Tự nhiên, ĐHQG TP.HCM (1 tháng)

làm việc 1.75 tháng (từ tháng 7/2022 đến tháng 8/2022).

3.7. Nhóm của PGS. TS. Trần Giang Nam nghiên cứu đề tài “*Biểu diễn bất khả quy của đại số đường Leavitt và một số vấn đề liên quan*” gồm 4 thành viên, 1 khách mời và 1 học viên:

- PGS. TS. Trần Giang Nam, Viện Toán học, Viện Hàn lâm KHCNVN;
- GS. Roozbeh Hazrat, ĐH Western Sydney (2 tháng);
- PGS.TS. Vũ Thế Khôi, Viện Toán học, Viện Hàn lâm KHCNVN (2 tháng);
- TS. Hồ Minh Toàn, Viện Toán học, Viện Hàn lâm KHCNVN (2 tháng);
- TS. Lê Hoàng Mai, Trường ĐH Đồng Pháp (Khách mời, 1 tháng);
- ThS. Nguyễn Đình Nam, Trường ĐH Hà Tĩnh & Viện Toán học, Viện Hàn lâm KHCNVN (Học viên);

làm việc 4 tháng (từ tháng 8/2022 đến tháng 11/2022).

3.8. Nhóm của PGS. TS. Phạm Hùng Quý nghiên cứu đề tài “*Một số bài toán về nhiều trong đại số địa phương*” gồm 3 thành viên:

- PGS. TS. Phạm Hùng Quý, Trường ĐH FPT;
- PGS. TS. Đoàn Trung Cường, Viện Toán học, Viện Hàn lâm KHCNVN (3 tháng)
- TS. Dương Thị Hương, Trường ĐH Thăng Long (3 tháng);

làm việc 4 tháng (từ tháng 3/2022 đến tháng 6/2022).

3.9. Nhóm của GS. TSKH. Đỗ Đức Thái và TS. Tô Tất Đạt nghiên cứu đề tài “*Lý thuyết đa thể vị và ứng dụng trong hình học phức và hệ động lực phức*” gồm 5 thành viên, 1 khách mời và 1 học viên :

- GS. TSKH. Đỗ Đức Thái, Trường ĐH Sư phạm Hà Nội;
- TS. Tô Tất Đạt, ĐH Sorbonne, Pháp (3 tháng);
- TS. Đỗ Thái Dương, Viện Toán học, Viện Hàn lâm KHCNVN (2 tháng);
- TS. Huỳnh Đình Tuân, Trường ĐH Sư phạm, ĐH Huế (2 tháng);
- TS. Nguyễn Văn Thiện, Trường ĐH FPT (2 tháng);
- TS. Vũ Đức Việt, ĐH Cologne, Đức (Khách mời, 9 ngày);
- Nghiêm Trần Trung, ĐH British Columbia, Canada (Học viên, 2 tháng)

làm việc 3 tháng (từ tháng 7/2022 đến tháng 9/2022).

3.10. Nhóm của TS. Nguyễn Tất Thắng nghiên cứu đề tài “*Đa thức Alexander và tô pô của ánh xạ đa thức*” gồm 3 thành viên, 2 khách mời và 2 học viên:

- TS. Nguyễn Tất Thắng, Viện Toán học, Viện Hàn lâm KHCNVN;
- GS. TSKH. Phùng Hồ Hải, Viện Toán học, Viện Hàn lâm KHCNVN (2 tháng);
- TS. Đinh Sĩ Tiệp, Viện Toán học, Viện Hàn lâm KHCNVN;
- TS. Đặng Tuấn Hiệp, Trường ĐH Đà Lạt (Khách mời, 1 tháng);
- GS. Phạm Tiến Sơn, Trường ĐH Đà Lạt (Khách mời, 1 tuần);
- ThS. Võ Quốc Bảo, Viện Toán học, Viện Hàn lâm KHCNVN (Học viên);
- Nguyễn Khánh Hưng, Viện Toán học, Viện Hàn lâm KHCNVN (Học viên)

làm việc 3 tháng (từ tháng 4/2022 đến tháng 6/2022).

3.11. Nhóm của TS. Trần Nam Trung nghiên cứu đề tài “*Độ sâu và chỉ số chính quy của bao đóng nguyên của lũy thừa các ideal đơn thức*” gồm 5 thành viên:

- TS. Trần Nam Trung, Viện Toán học, Viện Hàn lâm KHCNVN;
- TS. Lê Xuân Dũng, Trường ĐH Hồng Đức (2 tháng);
- TS. Trương Thị Hiền. Trường ĐH Hồng Đức;
- GS. TSKH. Lê Tuấn Hoa, Viện Toán học, Viện Hàn lâm KHCNVN;
- TS. Nguyễn Thu Hằng, Trường ĐH Khoa học, Đại học Thái Nguyên (2 tháng)

làm việc 3 tháng (từ tháng 3/2022 đến tháng 5/2022).

Nghiên cứu viên sau tiến sĩ:

- TS. Jorge Cely nghiên cứu sau Tiến sĩ về đề tài “*Tích phân motivic và liên hệ với lý thuyết biểu diễn*”; làm việc tại Viện 6 tháng trong năm 2022 (từ tháng 7/2022 đến tháng 6/2023);

- TS. Đỗ Trọng Hoàng, ĐH Bách Khoa Hà Nội nghiên cứu sau Tiến sĩ về đề tài “*Các tính chất đồng điều của ideal nhị thức*”; làm việc tại Viện 6 tháng trong năm 2022 (từ tháng 7/2021 đến tháng 6/2022);

- TS. Đặng Quốc Huy nghiên cứu sau Tiến sĩ về đề tài “*Không gian moduli của phủ Galois (của đường cong)*”; làm việc tại Viện 10 tháng trong năm 2022 (từ tháng 11/2021 đến tháng 10/2022);

- TS. Trịnh Duy Tiến, Trường ĐH Sư phạm Hà Nội nghiên cứu sau Tiến sĩ về đề tài “*Hệ số Fourier của dạng các tự đẳng cấu*”; làm việc tại Viện 7 tháng trong năm 2022 (từ tháng 10/2021 đến tháng 3/2022 và 9/2022 đến tháng 2/2023);

- TS. Phạm Văn Thắng, Trường ĐH Khoa học Tự nhiên, ĐHQGHN nghiên cứu sau tiến sĩ về đề tài “*Bài toán khoảng cách Erdos và Falconer, Lý thuyết hạn chế, Hình học liên thuộc, và các mối liên hệ*”; làm việc tại Viện 12 tháng (từ tháng 1/2022 đến tháng 12/2022).

Giải tích: 3 nhóm và 3 cá nhân

3.12. Nhóm của GS. Mouez Dimassi và GS. Fujie Setsuro nghiên cứu đề tài “*Semi-classical Analysis For system of Pseudo-differential Operator*” gồm 2 thành viên và 1 khách mời:

- GS. Mouez Dimassi, ĐH Bordeaux, Pháp;
 - GS. Fujie Setsuro, ĐH Ritsumeikan, Nhật Bản;
 - TS. Higuchi Kenta, ĐH Ehime, Nhật Bản (Khách mời, 10 ngày)
- làm việc 2 tháng (từ tháng 9/2022 đến tháng 11/2022).

3.13. Nhóm của TS. Nguyễn Tuấn Duy và TS. Lâm Hoàng Nguyên nghiên cứu đề tài “*Functional Inequalities with weights: new approaches, results and applications*” gồm 3 thành viên:

- TS. Nguyễn Tuấn Duy, Trường ĐH Tài chính - Marketing;
 - TS. Đào Nguyên Anh, Trường ĐH Kinh tế TP.HCM;
 - TS. Lâm Hoàng Nguyên, ĐH Memorial of Newfoundland, Canada
- làm việc 2 tháng (từ tháng 5/2022 đến tháng 6/2022).

3.14. Nhóm của PGS. TS. Đinh Thanh Đức nghiên cứu đề tài “*Một vài vấn đề chọn lọc trong phương trình vi tích phân bậc phân, lý thuyết bất đẳng thức tích phân và ứng dụng*” gồm 3 thành viên và 1 khách mời:

- PGS. TS. Đinh Thanh Đức, Trường ĐH Quy Nhơn;
 - TS. Trần Đình Phụng, Trường ĐH Tài chính - Marketing (3 tháng);
 - GS. Vũ Kim Tuấn, ĐH West Georgia, Mỹ (1.25 tháng);
 - TS. Võ Thị Bích Khuê, Trường ĐH Tài chính - Marketing (Khách mời, 17 ngày)
- làm việc 3 tháng, từ tháng 7/2022 đến tháng 9/2022.

Cá nhân:

- GS. TSKH. Nguyễn Việt Anh, Trường ĐH Tổng hợp Lille, Pháp nghiên cứu về đề tài “*Chiều ngang và số Lelong tổng quát của một dòng dương đa điều hòa*”, làm việc tại Viện 1 tháng (từ tháng 7/2022 đến tháng 8/2022);
- PGS. TS. Lương Đăng Kỳ, Trường ĐH Quy Nhơn nghiên cứu về đề tài “*Về một số bài toán trong Giải tích điều hòa và Lý thuyết toán tử*”; làm việc tại Viện 1 tháng trong năm 2022 (từ tháng 11/2021 đến tháng 1/2022).

Nghiên cứu viên sau tiến sĩ:

- TS. Phạm Việt Hải, ĐH Bách Khoa Hà Nội nghiên cứu sau Tiến sĩ về đề tài “*Toán tử và nửa nhóm toán tử trên không gian hàm*”; làm việc tại Viện 6 tháng (từ tháng 7/2022 đến tháng 12/2022).

Phương trình vi phân và hệ động lực: 5 nhóm

3.15. Nhóm của GS. Nguyễn Hữu Dur nghiên cứu đề tài “*Các bài toán ổn định và điều khiển hệ động lực và ứng dụng*” gồm 6 thành viên, 1 khách mời:

- GS. Nguyễn Hữu Dur, Trường ĐH Khoa học Tự nhiên, ĐHQGHN;
- PGS. TS. Võ Hoàng Hưng, Trường ĐH Sài Gòn (4 tháng);
- TS. Nguyễn Thu Hà, Trường ĐH Điện Lực (4 tháng);
- GS. Keonhee Lee, ĐHQG Chungnam, Hàn Quốc (2.75 tháng);
- TS. Nguyễn Thanh Nguyên, ĐHQG Chungnam, Hàn Quốc (2.75 tháng);
- TS. Nguyễn Ngọc Thạch, ĐHQG Chungnam, Hàn Quốc (3 tháng);
- PGS. TS. Jihoon Lee, ĐHQG Chungnam, Hàn Quốc (Khách mời, 0.75 tháng)

làm việc 4 tháng (từ tháng 5/2022 đến tháng 8/2022).

3.16. Nhóm của TS. Trịnh Việt Dục và PGS.TS. Ngô Quốc Anh nghiên cứu đề tài “*Phương trình vi phân đạo hàm riêng trong vật lý và hình học*” gồm 5 thành viên:

- TS. Trịnh Việt Dục, Trường ĐH Khoa học Tự nhiên, ĐHQGHN;
- PGS. TS. Ngô Quốc Anh, Trường ĐH Khoa học Tự nhiên, ĐHQGHN;

- TS. Nguyễn Văn Hoàng, Trường ĐH FPT;
- GS. Phan Thành Nam, ĐH Ludwig Maximilian München, Đức (1 tháng);

làm việc 4 tháng (từ tháng 8/2022 đến tháng 11/2022).

3.17. Nhóm của PGS. TS. Lê Văn Hiện nghiên cứu đề tài “*Một số bài toán định tính trong lý thuyết ổn định và điều khiển các hệ động lực suy biến*” gồm 2 thành viên:

- PGS. TS. Lê Văn Hiện, Trường ĐH Sư phạm Hà Nội;
- PGS. TS. Đỗ Đức Thuận, ĐH Bách Khoa Hà Nội (1 tháng)

làm việc 2 tháng trong năm 2022 (từ tháng 12/2021 đến tháng 2/2022).

3.18. Nhóm của PGS. TSKH. Nguyễn Thiệu Huy nghiên cứu đề tài “*Lý thuyết định tính cho một số lớp phương trình tiến hóa và động lực học thủy khí*” gồm 4 thành viên:

- PGS. TSKH. Nguyễn Thiệu Huy, ĐH Bách Khoa Hà Nội;
- TS. Vũ Thị Ngọc Hà, ĐH Bách Khoa Hà Nội;
- TS. Trần Thị Kim Oanh, ĐH Bách khoa Hà Nội;
- TS. Phạm Trường Xuân, Trường ĐH Thủy lợi

làm việc 1 tháng trong năm 2022 (từ tháng 11/2021 đến tháng 1/2022).

3.19. Nhóm của TS. Võ Ngọc Thiệu nghiên cứu đề tài “*Các khía cạnh đại số và giải tích của nghiệm của các phương trình vi phân*” gồm 3 thành viên và 2 khách mời:

- TS. Võ Ngọc Thiệu, Trường ĐH Tôn Đức Thắng;
- TS. Hà Văn Hiếu, Trường ĐH Kinh tế Luật TP.HCM;
- TS. Trần Thị Hiếu Nghĩa, Trường ĐH Sư phạm TP. HCM;
- GS. TSKH. Đỗ Ngọc Diệp, Trường ĐH Thăng Long (Khách mời, 15 ngày)
- PGS. TS. Lê Anh Vũ, Trường ĐH Kinh Tế Luật, ĐHQG TP.HCM (Khách mời);

làm việc 2 tháng (từ tháng 6/2022 đến tháng 7/2022).

Tối ưu và Tính toán Khoa học: 2 nhóm và 2 cá nhân

3.20. Nhóm của GS.TSKH. Phạm Kỳ Anh nghiên cứu đề tài “*Hệ động lực hiệu chỉnh liên kết với bao hàm thức đơn điệu và ứng dụng*” gồm 2 thành viên:

- GS. TSKH. Phạm Kỳ Anh, Trường ĐH Khoa học Tự nhiên, ĐHQGHN;
- TS. Trịnh Ngọc Hải, ĐH Bách Khoa Hà Nội

làm việc 1 tháng trong năm 2022 (từ tháng 11/2021 đến tháng 1/2022).

3.21. Nhóm của GS.TSKH. Nguyễn Đông Yên nghiên cứu đề tài “*Một số khảo cứu về lý thuyết trò chơi, quy hoạch nón, và toán kinh tế*” gồm 1 thành viên:

- TS. Trần Văn Nghị, Trường ĐH Sư phạm Hà Nội 2

làm việc 3 tháng (từ tháng 10/2022 đến tháng 12/2022).

Nghiên cứu viên sau tiến sĩ:

- TS. Lê Văn Hiến, Trường ĐH Hà Tĩnh nghiên cứu sau Tiến sĩ về đề tài “*Chuẩn hóa ràng buộc và điều kiện tối ưu cho quy hoạch nón và ứng dụng*”; làm việc tại Viện 4 tháng trong năm 2022 (từ tháng 9/2022 đến tháng 8/2023).
- TS. Nguyễn Thị Vân Hằng, Viện Toán học, Viện Hàn Lâm KHCNVN nghiên cứu sau Tiến sĩ về đề tài “*Các tính chất biến phân cấp hai của một số mô hình với hàm hợp và ứng dụng trong tối ưu và nghiên cứu tính ổn định của hệ biến phân*”; làm việc tại Viện 9 tháng trong năm 2022 (từ tháng 10/2021 đến tháng 9/2022).

Xác suất - Thống kê: 1 nhóm và 3 cá nhân

3.22. Nhóm của PGS. TS. Trần Minh Ngọc nghiên cứu đề tài “*Mô hình chuỗi thời gian với Học Sâu cho phân tích dữ liệu tài chính và kinh tế*” gồm 2 thành viên và 1 học viên:

- PGS. TS. Trần Minh Ngọc, ĐH Sydney, Úc;
- TS. Tạ Quốc Bảo, Trường ĐH Quốc Tế, ĐHQG TP.HCM;
- Nguyễn Thị Hiền, Trường ĐH Thương mại (Học viên)

làm việc 2 tháng (từ tháng 7/2022 đến tháng 8/2022).

Cá nhân:

- TS. Lưu Hoàng Đức, Viện Toán học, Viện Hàn Lâm KHCNVN nghiên cứu về đề tài “*Rough path theory and applications*”; làm việc tại Viện 2 tháng (từ tháng 6/2022 đến tháng 8/2022).
- PGS. TS. Ngô Hoàng Long, Trường ĐH Sư phạm Hà Nội nghiên cứu về đề tài “*Phương pháp số cho phương trình vi phân ngẫu nhiên với hệ số không Lipschitz*”; làm việc tại Viện 1 tháng (tháng 10/2022).

Nghiên cứu viên sau tiến sĩ:

- TS. Trịnh Thị Hương, Trường ĐH Thương Mại nghiên cứu sau Tiến sĩ về đề tài “*Tác động biên của mô hình hồi quy đa hợp với hàm hợp biến đa hợp và một số ứng dụng*”; làm việc tại Viện 4 tháng trong năm 2022 (từ tháng 9/2022 đến tháng 2/2023).

Toán ứng dụng: 3 nhóm và 1 cá nhân

3.23. Nhóm của GS. TSKH. Đinh Dũng nghiên cứu đề tài “*Xấp xỉ một số bài toán có số chiều rất lớn bằng mạng neuron sâu*” gồm 3 thành viên:

- GS. TSKH. Đinh Dũng, Viện Công nghệ Thông tin, ĐHQGHN;
- PGS. TS. Phạm Thành Dương, Trường ĐH Việt Đức (2 tháng);
- TS. Nguyễn Văn Kiên, Trường ĐH Giao thông Vận tải (2 tháng)

làm việc 1 tháng trong năm 2022 (từ tháng 11/2021 đến tháng 1/2022).

3.24. Nhóm của TS. Ông Thanh Hải nghiên cứu đề tài “*Giải pháp tính toán hiệu năng cao cho việc giải bài toán nước nông trong mô phỏng dòng chảy và bài toán lan truyền chất*” gồm 2 thành viên:

- TS. Ông Thanh Hải, Trường ĐH Khoa học Tự nhiên, ĐHQG TP.HCM;
- TS. Lê Ánh Hạ, Trường ĐH Khoa học Tự nhiên, ĐHQG TP.HCM

làm việc 2 tháng (từ tháng 8/2022 đến tháng 9/2022).

3.25. Nhóm của PGS. TS. Đinh Công Hường nghiên cứu đề tài “*Thiết kế một số bộ quan sát trạng thái kích hoạt sự kiện với sự hỗ trợ của các thuật toán học máy cho một số lớp hệ động lực không chắc chắn chịu tác động của trễ và nhiễu*” gồm 2 thành viên và 1 học viên:

- PGS. TS. Đinh Công Hường, Trường ĐH Quy Nhơn;

- TS. Lê Thanh Hiếu, Trường ĐH Quy Nhơn;
 - Đào Thị Hải Yên, Trường ĐH Quy Nhơn (Học viên)
- làm việc 2 tháng (từ tháng 11/2021 đến tháng 1/2022).

Cá nhân:

- TS. Nguyễn Thanh Phương, ĐH Tổng hợp L'Aquila (Ý) nghiên cứu về đề tài "*Hệ thống học máy trước nguy cơ bị lợi dụng: Về sự an toàn của các hệ khuyến nghị trong ngành Công nghệ phần mềm*"; làm việc tại Viện 1.25 tháng (từ tháng 7/2022 đến tháng 8/2022).

HOẠT ĐỘNG KHOA HỌC

Hình thức trao đổi khoa học thường xuyên của Viện là hoạt động Seminar do các nhóm nghiên cứu tổ chức.

Các hội nghị, hội thảo được tổ chức gắn liền với chủ đề của các nhóm chuyên môn đang làm việc tại Viện, để thúc đẩy các đề tài nghiên cứu, đồng thời định hướng các nhà khoa học trẻ, nghiên cứu sinh, sinh viên trong nghiên cứu khoa học.

Trong khuôn khổ của Chương trình Toán, một số hoạt động tập huấn dành cho giáo viên, trường hè dành cho học sinh, sinh viên, hoạt động phổ biến kiến thức khoa học cũng đã được tổ chức.

Hội nghị, hội thảo

Trong năm, Viện đã tổ chức 7 hội nghị, hội thảo.

1. Hội thảo “*Giải tích tiệm cận và điều hòa, phương trình tiến hóa và ứng dụng*”

Thời gian, địa điểm: 18-19/01/2022 tại VIASM (trực tiếp và trực tuyến).

Số người tham dự: 70.

Hội thảo nhằm mục đích giới thiệu một số phương pháp và cách tiếp cận cơ bản cũng như những phát triển gần đây trong lĩnh vực phân tích tiệm cận và điều hòa, phương trình tiến hóa và ứng dụng của chúng.

Hội thảo có sự tham gia của các báo cáo viên là các giáo sư, chuyên gia đầu ngành thuộc bốn châu lục với các múi giờ khác nhau là: Á, Âu, Mỹ và Úc và sự tham dự trực tiếp của gần 40 nhà khoa học, nghiên cứu sinh, học viên cao học và sinh viên năm cuối, hội nghị còn chào đón khoảng 30 đại biểu tham dự online là các bạn sinh viên, học viên cao học, nghiên cứu sinh và một số nhà nghiên cứu trong và ngoài nước.

2. Hội thảo “*Hình học Đại số và Lý thuyết kì dị*”

Thời gian, địa điểm: 24-26/4/2022 tại Tuần Châu

Số người tham dự: 14.

Hội thảo do VIASM phối hợp với trường ĐH Thăng Long và Trường ĐH Khoa học Tự nhiên - ĐHQGHN đồng chủ trì tổ chức. Hội thảo có sự

tham gia của 11 đại biểu là các nhà toán học quốc tế trong lĩnh vực hình học đại số và lý thuyết kì dị.

3. Hội nghị “*triển khai thực hiện Chương trình trọng điểm quốc gia phát triển Toán học giai đoạn 2021-2030 đối với Khoa Toán ba miền*”

Thời gian, địa điểm: 19/5/2022 tại Trường ĐH Quy Nhơn

Số người tham dự: 24.

Viện Nghiên cứu cao cấp về Toán (VIASM) và Trường Đại học Quy Nhơn phối hợp tổ chức Hội nghị triển khai thực hiện chương trình đối với 03 khoa Toán: Khoa Toán-Cơ-Tin học của Trường Đại học Khoa học tự nhiên - Đại học Quốc gia Hà Nội (ĐH KHTN – ĐHQG HN), Khoa Toán-Tin của Trường Đại học Khoa học tự nhiên - Đại học Quốc gia Thành phố Hồ Chí Minh (ĐH KHTN - ĐHQG TP.HCM) và Khoa Toán và Thống kê của Trường Đại học Quy Nhơn (ĐHQN).

Hội nghị đánh giá những kết quả thực hiện được trong Chương trình Toán năm 2021, thảo luận kế hoạch triển khai thực hiện Chương trình Toán năm 2022 đồng thời thống nhất xây dựng một số hoạt động phối hợp chung giữa 03 khoa trong thời gian tới.

Cũng tại hội nghị, VIASM triển khai Thông tư 22/2022/TT-BTC (gọi tắt là Thông tư 22) do Bộ Tài chính ban hành, về hướng dẫn quản lý và sử dụng kinh phí chi thường xuyên thực hiện chương trình trọng điểm quốc gia phát triển Toán học, tạo thuận lợi cho các đơn vị đi vào thực hiện chương trình giai đoạn 2021 – 2030.

4. Hội thảo “*Lý thuyết mã và một số nội dung liên quan*”

Thời gian, địa điểm: 4-8/7/2022 tại VIASM (trực tiếp và trực tuyến).

Số người tham dự: 70.

Hội thảo gồm có 5 báo cáo mời của các nhà nghiên cứu đến từ Việt Nam, Singapore, Ấn Độ,... Hội thảo được tổ chức với mục tiêu giới thiệu những kiến thức cơ bản về lý thuyết mã hóa và các khái niệm liên quan cho sinh viên tốt nghiệp đại học, cao học, nghiên cứu sinh và các nhà toán học quan tâm ở Việt Nam, Đông Nam Á, Ấn Độ và các nước khác ở Châu Á. Điều này cũng sẽ giới thiệu cho chúng ta nhiều ứng dụng của lý thuyết mã hóa, bao gồm trong mật mã (mật mã dựa trên mã), tính toán DNA (mã DNA), tính toán lượng tử (mã sửa lỗi lượng tử).

5. Hội thảo thường niên năm 2022

Thời gian, địa điểm: 30-31/8/2022 tại VIASM (trực tiếp và trực tuyến).

Số người tham dự: 82.

Hội thảo thường niên là một trong những hoạt động khoa học lớn nhất trong năm, được tổ chức định kỳ mỗi năm một lần. Các bài giảng tại Hội thảo thường niên đánh dấu sự phát triển qua từng giai đoạn của Toán học Việt Nam.

Các báo cáo mời tại Hội thảo thường niên 2022 gồm có: GS. David Pointcheval (ENS Paris), GS. Nguyễn Hữu Dư (Trường Đại học KHTN, ĐHQGHN), GS. John R. Birge (The University of Chicago Booth School of Business), GS. Oscar Garcia-Prada (Institute of Mathematical Sciences, Madrid), GS. Phan Văn Tuộc (University of Tennessee – Knoxville).

6. Hội thảo “*Gặp gỡ Tô pô*”

Thời gian, địa điểm: 21-25/11/2022 tại VIASM

Số người tham dự: 25.

Hội thảo được tổ chức với mục tiêu kết nối và chia sẻ các kết quả nghiên cứu mới nhất của các nhà nghiên cứu trong lĩnh vực Tô pô đại số trong và ngoài nước. Từ đó, thúc đẩy sự hợp tác nghiên cứu của các nhà Tô pô trẻ trong cả nước. Bên cạnh đó, hội thảo cũng là dịp để các bạn sinh viên, học viên cao học, và những người quan tâm có cơ hội tiếp cận với các hướng nghiên cứu mới từ các nhà Tô pô trẻ năng động.

Hội thảo có sự tham gia của các diễn giả: PGS. TS. Nguyễn Đặng Hồ Hải (Trường ĐH Khoa học, Đại học Huế), TS. Ngô Anh Tuấn (Trường ĐH Khoa học Tự nhiên Hà Nội, ĐHQGHN), TS. Nguyễn Thế Cường (Trường ĐH Khoa học Tự nhiên, ĐHQGHN), GS. Hans-Werner Henn (Đại học Strasbourg, CH Pháp), TS. Bùi Anh Tuấn (Trường ĐH Khoa học Tự nhiên, ĐHQG HCM), GS. Christian Ausoni (Đại học Paris 13, Pháp), GS. Antoine Touzé (ĐH Lille, Pháp).

7. Hội thảo “*Tài nguyên và đánh giá các hệ thống xử lý tiếng nói Đông phương lần thứ 25*”

Thời gian, địa điểm: 24-26/11/2022 tại VIASM

Số người tham dự: 92.

Hội thảo do Hiệp hội Xử lý tiếng nói và Ngôn ngữ Tiếng Việt (VLSP) phối hợp với Viện Nghiên cứu Cao cấp về Toán học Việt Nam (VIASM) tổ chức. Hội thảo được tổ chức lần đầu tiên tại Hà Nội vào năm 2007. Đến năm 2022, Hội thảo trở lại với mục tiêu trao đổi ý kiến, chia sẻ thông tin và thảo

luận các vấn đề khu vực về sáng tạo, sử dụng, phổ biến kho ngữ liệu nói của các ngôn ngữ phương Đông và các phương pháp đánh giá hệ thống nhận dạng/tổng hợp giọng nói cũng như thúc đẩy nghiên cứu lời nói về phương Đông. Đặc biệt, hội thảo có sự tham gia của hai diễn giả hàng đầu thế giới: GS. Haizhou Li (ĐH Hongkong & ĐHQG Singapore) và GS. Sakriani Sakti (Viện Khoa học và Công nghệ Japan). Hội thảo cũng đón nhận sự quan tâm rất lớn từ các nhà nghiên cứu đến từ các quốc gia trên thế giới.

Chương trình chuyên biệt, khóa học ngắn hạn

Trong năm 2022, Viện đã tổ chức 3 khóa học ngắn hạn và 4 trường chuyên biệt.

1. Trường hè “*Phương trình đạo hàm riêng và các chủ đề liên quan*”

Thời gian, địa điểm: 25-28/7/2022 tại VIASM.

Số người tham dự: 30.

Giảng viên: Giáo Sư Đinh Nho Hào (Viện Toán Học - Viện HLKHCN Việt Nam), Giáo Sư Đặng Đức Trọng (Trường Đại học Khoa học Tự nhiên, Đại học Quốc gia TP.HCM), Tiến sĩ Dương Giao Kỳ (Trường Đại học An Giang, Đại học Quốc gia TP.HCM), Lê Thị Thu Thủy (Nghiên cứu sinh, Đại học North Carolina-Charlotte, Mỹ), Nguyễn Trung Thành (Đại học Rowan, Mỹ), Nguyễn Hoàng Lộc (Đại học North Carolina-Charlotte, Mỹ)

Phụ trách chuyên môn: Giáo sư Phan Văn Tuộc (Đại học Tennessee-Knoxville), Giáo sư Trần Vĩnh Hưng (Đại học Wisconsin-Madison)

2. Chuỗi bài giảng ngắn “*Số Lelong tổng quát cho dòng dương đa điều hòa dưới*”

Thời gian, địa điểm: 25-29/7/2022 tại VIASM.

Số người tham dự: 15.

Giảng viên: Nguyễn Việt Anh, ĐH Lille, Pháp.

3. Trường hè “*Toán học của hệ khí Bose tương tác*”

Thời gian, địa điểm: 1-5/8/2022 tại VNCCCT (trực tiếp và trực tuyến)

Số người tham dự: 86.

Giảng viên: Phan Thành Nam (LMU Munich, Đức), Nguyễn Trọng Toán (Đại học Penn State, USA).

Trợ giảng: Dương Giao Kỳ (Trường Đại Học An Giang)

4. Trường hè “*Lý thuyết nhóm và các Lý thuyết Biểu diễn 2022*” Thời gian, địa điểm: 9/8-21/8/2022 tại VIASM.

Số người tham dự: 37.

Giảng viên: GS. Martin Liebeck (Imperial College London, Vương Quốc Anh); GS. Gabriel Navarro (Đại học Valencia, Tây Ban Nha); GS. Fernando Rodriguez Villegas (ICTP); GS. Jay Taylor (Đại học Manchester, Vương Quốc Anh); GS. Olivier Dudas (Đại học Paris 6, Cộng hòa Pháp)

5. Trường hè về Mật mã

Thời gian, địa điểm: 24-30/8/2022 tại VIASM.

Số người tham dự: 79.

Giảng viên: GS. Damien Stehlé (Ecole Normale Supérieure de Lyon, Pháp); GS. David Pointcheval (Ecole Normale Supérieure de Paris); GS Phan Dương Hiệu (Telecom Paris, Institut Polytechnique de Paris); GS. Triệu Ni (Đại học Arizona); GS. Jian Guo (Đại học công nghệ Nanyang, Singapore).

6. Khóa học ngắn hạn: “*Phương trình Stokes dừng và phương trình Navier-Stokes*”

Thời gian, địa điểm: 7-18/11/2022 tại VIASM.

Số người tham dự: 22.

Giảng viên: GS. Chérif Amrouche (Université de Pau et des Pays de l'Adour, France)

7. Khóa học ngắn hạn về hệ động lực

Thời gian, địa điểm: 21/11-2/12/2022 tại VIASM.

Số người tham dự: 30.

Giảng viên: GS. Lee Keonhee (Chungnam National University, Korea).

Hỗ trợ triển khai hoạt động của Chương trình Toán

Ngày 22/12/2020, Thủ tướng Chính phủ đã ký Quyết định số 2200/QĐ-TTg phê duyệt Chương trình trọng điểm quốc gia phát triển Toán học giai đoạn 2021-2030. VIASM tiếp tục được giao là đơn vị thường trực điều phối các hoạt động của Chương trình.

Viện đã hoàn thành được khoảng 90% kế hoạch triển khai Chương trình Toán năm 2022. Một số nội dung về Hỗ trợ đào tạo tài năng và nâng cao chất lượng nguồn nhân lực ngành Toán và Xây dựng và phát triển Hệ tri thức các khoa học về Toán trong Hệ tri thức Việt số hóa đã báo cáo Lãnh đạo Bộ Giáo dục và Đào tạo để điều chỉnh kế hoạch. Cụ thể:

1. Xây dựng các văn bản liên quan đến quản lý và thực hiện Chương trình

- Ngày 30/03/2022, Bộ Tài chính đã ban hành Thông tư số 22/2022/TT-BTC hướng dẫn quản lý và sử dụng kinh phí chi thường xuyên thực hiện Chương trình trọng điểm quốc gia phát triển Toán học giai đoạn 2021-2030.

- Ngày 30 tháng 12 năm 2022, Bộ trưởng Bộ Giáo dục và Đào tạo đã ban hành Quyết định số 4657/QĐ-BGDĐT ban hành Quy chế xét tặng Giải thưởng công trình Toán học xuất sắc thuộc Chương trình trọng điểm quốc gia phát triển Toán học giai đoạn 2021 đến 2030.

- Viện đang tiếp tục tích cực và chủ động phối hợp với các Vụ, Cục chức năng để xây dựng Quy chế làm việc của Ban Điều hành và Dự thảo các văn bản quy định tổ chức, triển khai và thực hiện các nhiệm vụ của Chương trình, gồm:

+ Quy định về cấp học bổng cho sinh viên: Đã hoàn thiện bản dự thảo quy định gửi xin ý kiến các Vụ/Cục để trình Lãnh đạo Bộ ký ban hành.

+ Quy định về tổ chức xét chọn nghiên cứu viên: Tiếp tục thực hiện theo quy định do Giám đốc khoa học Viện NCCCT ký ban hành cho đến khi Quy chế tổ chức và hoạt động của Viện được rà soát, cập nhật, bổ sung.

2. Đẩy mạnh truyền thông phổ biến tri thức Toán học

- Viện đã triển khai xây dựng các bài viết tổng kết Chương trình giai đoạn 2010-2020 và định hướng về Toán học trong thế kỷ 21; Đã và đang triển khai xây dựng một số mô hình toán học để trưng bày tại Viện NCCCT và sử

dụng truyền thông cho các hoạt động của Chương trình Toán, xây dựng chuỗi sản phẩm về các ứng dụng đa dạng của Toán học trong cuộc sống.

- Đã tổ chức thành công 03 Ngày hội Toán học mở tại Thừa Thiên - Huế, Gia Lai, Đồng Tháp với gần 6.000 người tham dự và 01 Trường hè Toán và khoa học cho học sinh, sinh viên tại ICISE, Quy Nhơn.

3. Thúc đẩy công bố công trình Toán học chất lượng cao

- 07 đề tài KHCN cấp Bộ thuộc Chương trình Toán được phê duyệt triển khai từ năm 2022 đang được triển khai theo đúng kế hoạch được phê duyệt; 10 đề tài KHCN cấp Bộ được phê duyệt triển khai từ năm 2023.

- Dự thảo Đề án phát triển tạp chí Toán ứng dụng và Toán trong công nghiệp thuộc danh mục tạp chí uy tín trên thế giới (ECSI/Scopus) trên cơ sở tiếp nhận tạp chí Toán ứng dụng của Hội Toán học Việt Nam đã được xây dựng.

4. Thúc đẩy nghiên cứu ứng dụng Toán học, chú trọng phát triển một số lĩnh vực có nhu cầu cao trong cách mạng công nghiệp lần thứ tư

- Trong năm 2022, Viện đã tổ chức thành công 03 Hội thảo phối hợp giữa trường/viện - nhà nước - doanh nghiệp với hơn 400 người tham dự, về các chủ đề: Diễn đàn Công nghệ tài chính - Xu hướng Thế giới và thực tiễn Việt Nam; Hội thảo về Mô hình toán trong biến đổi khí hậu và môi trường; Hội thảo về một số ứng dụng Toán trong công nghiệp - Conference on Blockchain Computing.

5. Hỗ trợ triển khai chương trình giáo dục phổ thông môn Toán

- Tổ chức thành công 01 hội thảo về giảng dạy Xác suất Thống kê ở bậc phổ thông với gần 200 đại biểu tham dự trực tiếp và trực tuyến;

- Tổ chức thành công 02 khóa bồi dưỡng Giáo viên THPT chuyên Toán ở khu vực miền Bắc và miền Nam - miền Trung với gần 100 người tham dự; 01 khóa bồi dưỡng cho hơn 200 giáo viên tiểu học và 09 Khóa bồi dưỡng giáo viên THPT môn Toán tại Hà Nội, Nghệ An, Phú Yên, Bình Định, Thừa Thiên - Huế, Gia Lai, Đồng Tháp, Đà Nẵng.... với sự tham gia trực tiếp và trực tuyến của hơn 1.000 giáo viên Toán THPT, cán bộ quản lý các Phòng giáo dục, Sở GD&ĐT, giảng viên và sinh viên ngành Toán.

- Tổ chức thành công 01 Trại hè về Toán học và Stem cho gần 50 học sinh, trong đó có 35 học sinh khu vực vùng sâu, vùng xa.

6. Hỗ trợ đào tạo tài năng và nâng cao chất lượng nguồn nhân lực ngành Toán

- Tổ chức thành công 06 khóa đào tạo/khóa bồi dưỡng/trường hè cho khoảng 800 học sinh, sinh viên: 02 trường hè học sinh THPT chuyên Toán; 01 trường hè sinh viên và 04 khóa bồi dưỡng về các chủ đề thời sự trong Toán học hiện đại cho học sinh, sinh viên.

- Hỗ trợ chuyên môn cho 02 kỳ thi: kỳ thi Olympic Toán học sinh viên, học sinh và phối hợp tổ chức tập huấn đội tuyển dự thi Olympic Toán học quốc tế - IMO năm 2022. Kết quả đoàn Việt Nam đã đoạt 2 huy chương vàng, 2 huy chương bạc và 2 huy chương đồng, trong đó có một thí sinh xuất sắc đạt điểm tuyệt đối 42/42 điểm.

- Tổ chức thành công 04 chuyên đề về chuỗi khối (blockchain), vận trù học, thống kê ứng dụng và Giải tích toán học cho hơn 500 lượt người tham dự;

- Tổ chức 03 Khóa bồi dưỡng cho gần 300 giảng viên khối ngành Toán và Thống kê;

- Khảo sát, nghiên cứu, xây dựng cập nhật, chuẩn hóa 03 chuẩn chương trình đào tạo nhóm ngành Toán trình độ đại học và sau đại học: Không thực hiện nữa do Vụ GDDH là đơn vị chủ trì triển khai đã triển khai theo kế hoạch và đề án khác.

- Đang triển khai xây dựng khối kiến thức Toán trong các ngành kỹ thuật;

- Đang xây dựng quy định để triển khai thực hiện cấp học bổng cho sinh viên ngành Toán.

7. Xây dựng và phát triển Hệ tri thức các khoa học về Toán trong Hệ tri thức Việt số hóa

- Nâng cấp Công thông tin chương trình toán; nâng cấp, bổ sung tính năng cho CSDL các nhà khoa học về Toán.

- Xây dựng 01 Hệ thống bài tập, kiểm tra đánh giá trực tuyến môn Đại số tuyến tính 2.

- Xây dựng 01 bộ tài liệu về Một số chủ đề thực hành trải nghiệm trong môn Toán theo định hướng giáo dục STEM được dùng làm tài liệu bồi dưỡng, tập huấn cho GV Toán phổ thông trên cả nước theo các hoạt động của Chương trình trọng điểm quốc gia phát triển Toán học giai đoạn 2021-2030.

- Các học liệu, tài liệu, tạp chí được truy cập và khai thác (hệ thống MathScinet, SIAM,...).

- Tổ chức biên dịch 03 bộ tài liệu phục vụ đào tạo, đổi mới phương pháp giảng dạy và giới thiệu các hướng nghiên cứu, ứng dụng thời sự về Toán.

- Xây dựng 01 bộ tài liệu bao gồm các bài giảng và bài tập số học chuyên sâu làm tài liệu tham khảo chuyên sâu cho học sinh THPT chuyên Toán.

8. Xây dựng, củng cố và phát triển Viện Nghiên cứu cao cấp về Toán và một số trung tâm nghiên cứu, ứng dụng Toán học mạnh của Việt Nam

- Tổ chức thành công 03 Ngày hội Toán học mở tại Quy Nhơn, Hà Nội và TP. Hồ Chí Minh với hơn 4.000 người tham dự và 02 chuỗi bài giảng đại chúng cho các trường phổ thông tại TP Hồ Chí Minh và khu vực lân cận.

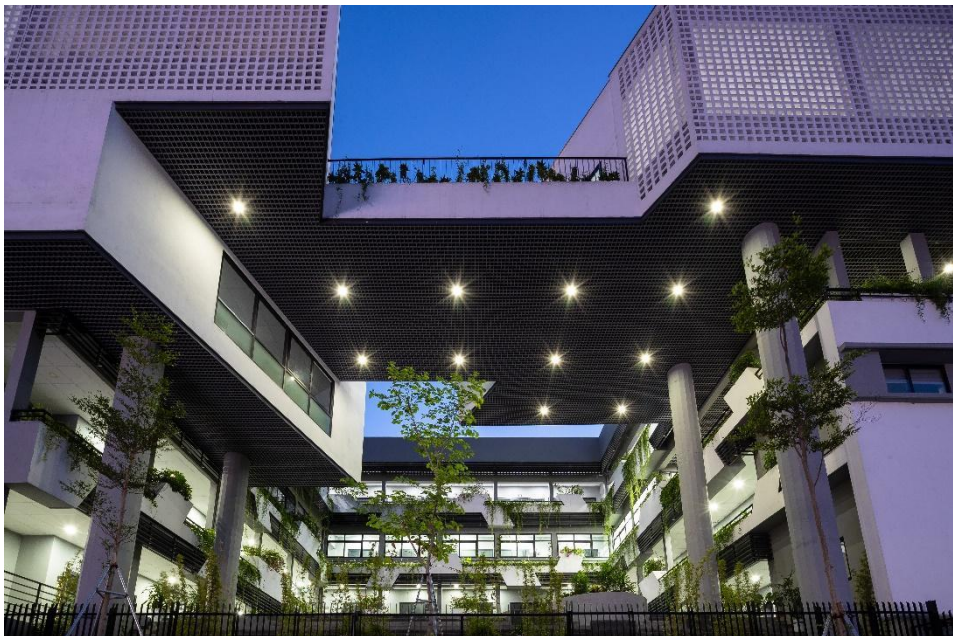
9. Đẩy mạnh hợp tác quốc tế trong nghiên cứu, ứng dụng và đào tạo Toán học

- Tạo điều kiện để các nhà khoa học, các tổ chức, đơn vị trong nước trở thành thành viên chính thức và khai thác hiệu quả các nguồn tài nguyên, dữ liệu của 02 Hiệp hội: Hội Toán học Mỹ (AMS), Hiệp hội Toán học Hoa Kỳ (MAA).

MỘT SỐ HÌNH ẢNH HOẠT ĐỘNG SELECTED PICTURES



Trụ sở Viện Nghiên cứu cao cấp về Toán, 157 Chùa Láng, Đống Đa, Hà Nội
VIASM Building, 157 Chua Lang, Dong Da, Hanoi





GS. Đức (David) Trần giảng bài tại Khóa học “Blockchain Mathematics and Computing” (Tháng 7/2022)

Prof. David Tran’s lecture at the Mini-course on Blockchain Mathematics and Computing (July, 2022)



Hội thảo về “Lý thuyết mã và một số nội dung liên quan” (Tháng 7/2022)

Workshop “Coding Theory and Related Concepts” (July, 2022)



*Lễ khánh thành trụ sở Viện Nghiên cứu cao cấp về Toán năm 2022
(Tháng 8/2022)
The Inauguration ceremony of the Institute for Advanced Study in Mathematics 2022
(August, 2022)*





GS. Ngô Bảo Châu phát biểu khai mạc Hội thảo thường niên 2022 (Tháng 8/2022)
Prof. Ngo Bao Chau at the Annual Meeting 2022 (August, 2022)



Diễn đàn “Công nghệ tài chính - Xu hướng thế giới và thực tiễn Việt Nam-Vietnam Fintech Forum” (Tháng 10/2022)
Vietnam Fintech Forum (October, 2022)



*Hội thảo thường niên “Mạng lưới thống kê ứng dụng Việt Nam năm 2022”
(Tháng 10/2022)
Vietnam Applied Statistics Network (VASN) Annual Meeting (October, 2022)*



*Hội thảo “Mô hình toán trong biến đổi khí hậu và môi trường” (Tháng 10/2022)
International Conference on Mathematical Modelling for Climate Change and Environment
(October, 2022)*

Một số Nghiên cứu viên làm việc tại Viện năm 2022
Selected pictures of Research Fellows in 2022



TS Phạm Văn Thắng
 University of Science, Vietnam
 National University Hanoi



TS Nguyễn Thị Vân Hằng
 Institute of Mathematics - VAST



TS Đặng Quốc Huy
 VIASM



TS Trịnh Thị Hương
 Thuongmai University



GS Đinh Dũng
 VNU - Information
 Technology Institute



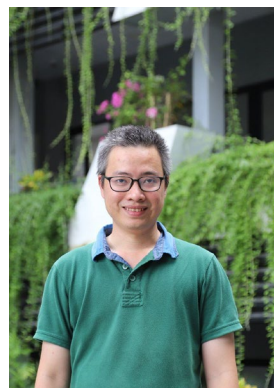
GS Keonhee Lee
 Chungnam National University



TS Trịnh Thanh Đèo
 VNUHCM - University of Science



GS Tô Tất Đạt
 Sorbonne Université



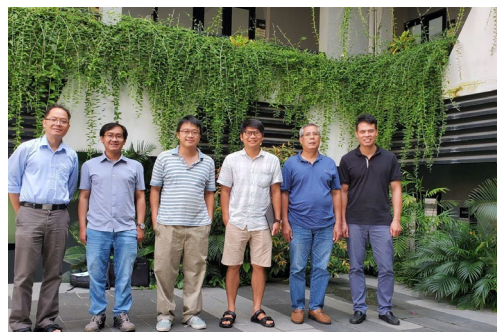
GS Phan Thành Nam
 LMU Munich

Một số nhóm nghiên cứu làm việc tại Viện năm 2022

Selected pictures of Research Groups in 2022



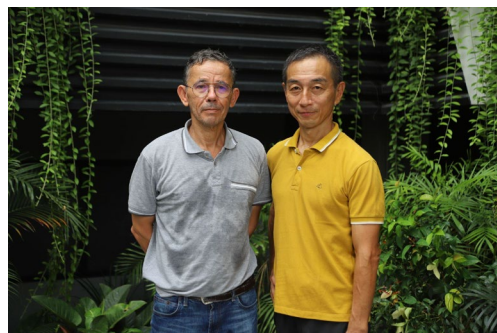
TS. Trịnh Viết Dược và cộng sự
Dr. Trịnh Viết Dược and collaborators



TS. Tô Tất Đạt và cộng sự
Dr. Tô Tất Đạt and collaborators



TS. Nguyễn Tuấn Duy, TS. Lâm Hoàng Nguyên và TS. Đào Nguyên Anh
Dr. Nguyen Tuan Duy, Dr. Lam Hoang Nguyen & Dr. Dao Nguyen Anh



GS. Mouez Dimassi và GS. Fujiie Setsuro
Prof. Mouez Dimassi and Prof. Fujiie Setsuro



TS. Trần Giang Nam và cộng sự
Dr. Tran Giang Nam and collaborators



PGS. Nguyễn Ngọc Hưng và TS. Tống Việt Phi Hùng
Assoc Prof. Nguyen Ngoc Hung & TS. Hung P. Tong - Viet



*Trường hè Mật mã (IACR-VIASM Summer School on Cryptography) (Tháng 8/2022)
IACR-VIASM Summer School on Cryptography (August, 2022)*



*Khóa bồi dưỡng giảng viên khu vực miền Nam với chủ đề “Thống kê nâng cao với phần mềm
thống kê R” (Tháng 6/2022)
Training course for Lecturer in the Southern Region 2022 “Advanced Statistics with Statistical
Software R (June, 2022)*



TRƯỜNG HÈ TOÁN HỌC 2022 (Tháng 7/2022)
Summer School in Mathematics for high school pupils and high school teachers (July, 2022)



Ngày hội Toán học mở - Math Open Day năm thứ 8 (MOD Hà Nội) (Tháng 10/2022)
Math Open Day Hanoi (October, 2022)



*Lễ ký kết hợp tác với Trường Đại học Ngoại Thương (Tháng 12/2022)
Signing Ceremony with Foreign Trade University (December, 2022)*



INTRODUCTION

The year 2022 was a pivotal year, marked by many significant activities for the Vietnam Institute for Advanced Study in Mathematics (VIASM). Many important legal documents of VIASM as well as of the National Program for the Development of Mathematics (NPDM) in the period 2021-2030 (Mathematics Program) have been reviewed, adjusted or newly developed. After the wave of the Covid-19 pandemic, VIASM has made great efforts to quickly adapt and complete most of the assigned tasks.

During the year, VIASM continued to organize coordinated research groups between domestic and foreign experts, focusing on topical fields of interest in many fields of theoretical and applied mathematics such as Algebra - Number Theory - Geometry - Topology; Analysis; Differential Equations and Dynamical Systems; Optimization and Scientific Computation; Probability - Statistics; Applied mathematics.

In 2022, the number of research fellows working at the Institute was 97, including 9 postdoc fellows. After two years of disruption due to the impact of the pandemic, from the end of February 2022, researchers from foreign schools and institutes were able to come to work at the Institute.

VIASM also organized 7 conferences/workshops, 3 mini-courses and 4 specialized schools. These are all in-depth scientific activities on tropical mathematics topics. In particular VIASM collaborated with the Abdus Salam International Center for Theoretical Physics (ICTP) to successfully organize the Summer School on Group Theory and Representation Theory in July 2022 with 5 lecture series by the world's leading experts. The Clay Mathematics Institute (CMI) also cooperated with VIASM and ICTP to organize this summer school. The summer school attracted nearly 80 students in person and online, including 7 students from Thailand, Indonesia, Philippines, Malaysia... sponsored for personal participation in Hanoi. This is also the first large-scale international activity (based on the number of foreign lecturers and students) that can be held directly at VIASM since 2020.

In August 2022, The IACR – VIASM Summer School on Cryptography (IACR) organized by the International Association for Cryptographic Research (IACR) in collaboration with the Institute for Advanced Study in Mathematics (VIASM) was officially opened. The LIA For Math VN Foundation and some major French universities have also participated in sponsoring the school. This is a major international activity, with the participation of leading scientists in the field of cryptography research such as Prof. Damien Stehlé, Prof. David Pointcheval, Prof. Phan Duong Hieu, Assoc. Zhao Ni, Prof. Jian Guo... Attending the summer school

were more than 80 students who are students, graduate students, PhD students and young scientists from 12 countries around the world as Vietnam, Singapore, Japan, Thailand, India, USA, Germany, France, Philippines, Turkey, Denmark and Australia (of which 25 students are foreigners and Vietnamese studying, working abroad). Also within the framework of the Summer School, Real World Crypto Day is a place to introduce the most practical applications of Crypto studies with the participation of many major experts. This is considered a preparation step for Vietnam to host IACR's Real-World Crypto conference in the near future.

In last August 2022, under Decision No. 2436/QĐ-BGDĐT dated August 29, 2022 of the Minister of Education and Training, from August to September 2022, VIASM has implemented activities to serve the International Evaluation Council to evaluate the performance of the Institute in the period 2016-2021. The International Evaluation Council highly appreciated the Institute's activities achieved in the period 2016-2021, and affirmed VIASM "has played a key role in enhancing and promoting international cooperation in Vietnam" and "has achieved its position after 10 years of establishment as an internationally competitive research center, with great potential in the future".

On August 30, 2022, after more than two years of implementation, the **VIASM headquarters' Inauguration ceremony** was successfully held, with the presence of former Deputy Prime Minister Vu Duc Dam, former Deputy Prime Minister Nguyen Thien Nhan and representatives of the Ministry of Education and Training, Ministry of Science and Technology, representatives of Schools, Institutes, and numerous mathematicians from Vietnam and abroad.

VIASM paid special attention to the development of Applied Mathematics in 2022 with outstanding activities such as building a network of applied statistics and operations, successfully organizing activities on blockchain, data science.

Cooperation activities have always been the crucial point of the Institute's development strategy, especially those connecting schools - Institutes - enterprises. In 2022, the Institute signed an Agreement for the establishment of "Vietnamese-French International Research Laboratory for Mathematics and Applications" (IRL FVMA) between the Vietnam Academy of Science and Technology (VAST), the French National Center for Scientific Research (CNRS) and VIASM, cooperation agreement with Foreign Trade University.

Within the framework of the NPDM, the Institute has implemented the tasks stated in the Prime Minister's Decision No. 2200/QĐ-TTg dated December 22, 2020 and achieved many remarkable results.

On March 30, 2022, the Ministry of Finance issued Circular No. 22/2022/TT-BTC guiding the management and use of recurrent expenditure funds for the implementation of the National Program for the Development of Mathematics in the period 2021-2030. On December 30, 2022, the Minister of Education and Training issued Decision No. 4657/QĐ-BGDĐT promulgating the Regulation on awarding the Excellent Mathematical Work Award under the National Program for the Development of Mathematics in the period of 2021 to 2030. VIASM is continuing to actively and proactively coordinate with functional Departments and Departments to develop working regulations of the Executive Board and draft documents regulating the organization, deploy and implementation of the tasks of the Program.

1. Organization and Personnel

1.1. Organization: The VIASM's organizational structure is streamlined, including:

- Board of Directors: based on 3-year terms;
- Office staff;
- Vietnamese-French International Research Laboratory for Mathematics and Applications" (IRL FVMA)
- Laboratory;
- Research groups and research individuals: based on annual selections of the VIASM Scientific Council.

1.2. Personnel:

a) The current Board of Directors consists of 3 members:

- Scientific Director: Prof. Ngo Bao Chau;
- Managing Director: Assoc. Prof. Le Minh Ha;
- Deputy Director: TS. Trinh Thi Thuy Giang.

b) Office: 14 staff, including: 1 Deputy Chief of Staff, 1 Chief Accountant, 8 staff and 3 employees.

2. VIASM Scientific Council

VIASM Scientific Council (for the term 2021-2024) consists of 15 members:

- Prof. Ngô Bảo Châu, VIASM and University of Chicago (USA);

- Prof. Hồ Tú Bảo, VIASM;
- Prof. Đinh Tiến Cường, National University of Singapore;
- Prof. Nguyễn Hữu Du, VNU - University of Science;
- Assoc. Prof. Lê Minh Hà, VIASM;
- Prof. Phùng Hồ Hải, Institute of Mathematics - VAST;
- Prof. Lê Tuấn Hoa, Institute of Mathematics - VAST;
- Prof. Trần Vĩnh Hưng, University of Wisconsin-Madison (USA);
- Prof. Nguyễn Xuân Hùng, CIRTECH Institute - HCMC University of Technology;
- Assoc. Prof. Vũ Hoàng Linh, VNU - University of Science;
- Prof. Nguyễn Xuân Long, University of Michigan (USA);
- Prof. Phan Thanh Nam, Ludwig Maximilian University of Munich (Germany);
- Assoc. Prof. Phạm Tiến Sơn, DaLat University;
- Assoc. Prof. Trần Văn Tấn, Hanoi National University of Education;
- Prof. Phạm Hữu Tiệp, Rutgers University (USA);

3. International Advisory Board

- Prof. Jean-Pierre Bourguignon, École Polytechnique (France);
- Prof. Robert Fefferman, University of Chicago (USA);
- Prof. Martin Grötschel, Berlin-Brandenburg Academy of Sciences and Humanities (Germany);
- Prof. Benedict Gross, Harvard University (USA);
- Prof. Phillip Griffiths, Institute for Advanced Study, Princeton (USA);
- Prof. Madabusi Santanam Raghunathan, Indian Institute of Technology Bombay (India).

4. Distinguished Associate Members

- Prof. Hồ Tú Bảo, VIASM;
- Dr. Nguyễn Hồng Đức, Thang Long University;
- Prof. David Trần, University of Massachusetts Boston (USA);
- Prof. Thomas Hales, University of Pittsburgh (USA);
- Prof. Phan Dương Hiệu, University of Limoges (France);
- Prof. Lê Tuấn Hoa, Institute of Mathematics - VAST;

- Dr. Vương Quân Hoàng, Phenikaa University;
- Prof. Bùi Hải Hưng, VinAI Research;
- Assoc. Prof. Trần Vĩnh Hưng, University of Wisconsin Madison (USA);
- Assoc. Prof. Ngô Hoàng Long, Hanoi National University of Education;
- Prof. Nguyễn Xuân Long, University of Michigan (USA);
- Prof. Phan Thành Nam, Ludwig Maximilian University of Munich (Germany);
- Prof. Lionel Schwartz, Université Paris 13 (France);
- Prof. Phạm Hữu Tiệp, Rutgers University (USA);
- Dr. Nguyễn Chu Gia Vượng, Institute of Mathematics - VAST.

5. Center, Laboratory

5.1 Data Science Lab (VIASM-DSLAb)

After nearly 5 years of operation, the Data Science Laboratory led by Prof. Ho Tu Bao with members from several universities across the country, has carried out various activities in research, education and consulting.

Research activities:

- DSLab organizes monthly seminars, presenting and exchanging information about advances in artificial intelligence, machine learning and data science. Along with its efforts to pursue research at member's institutions in AI and data science, regular exchanges help DSLab jointly recognize and embrace new developments in machine learning and AI.
- Basic research of lab members focuses on machine learning and deep learning, with content on continual learning, deep generative models, deep learning theory, deep reinforcement learning, generative adversarial networks, graph network, big data analytics.
- Applied research focuses on natural language processing, as well as data science in health and economics, with work on building Vietnamese language resources, new methods of deep learning for language processing such as language models, chatbots, document analysis and recognition.

- Hosted an AI joint seminar with the participation of teachers, students, researchers from more than thirty universities and companies across the country in both onsite and online formats. The AI joint seminar invites prestigious speakers to share research results and introduce new advances in the field of AI. Seminar is held monthly and has been done for 8 months with experts from the US, Canada, Australia, UK, Japan, China.
- Organized the 25 th Conference of the Oriental COCOSDA (Committee for the Coordination and Standardisation of Speech Databases and Assessment Techniques) and the 9 th Workshop for Vietnamese Language and Speech Processing.

Education activities:

- Most of the members are builders and in charge of data science training at schools of Vietnam National University, Hanoi University of Science and Technology, Academy of Posts and Telecommunications, Ton Duc Thang University...
- Participating in training and improving the Business Analytics program of the International School of Vietnam National University, Hanoi.
- Continue to help Foreign Trade University to build a new training program “Digital Business”, opened in 2022.

Consultation activities:

- Participating in the development of a number of national strategies on digital economy and digital society, on data strategy, national data center.
- Consulting and training on digital transformation for various provinces and organizations: Thai Nguyen, Thai Binh, Bac Giang, Hai Phong, Quang Tri, Binh Thuan, Ho Chi Minh City as well as Vietnam Oil and Gas Group (PVN), Vietnam National Coal and Mineral Industries Holding Corporation Limited (TVN), VNPT Group, training courses for small and medium enterprises...
- Participating in consulting and contributing to the digital transformation of vocational education at 11 colleges across the country.

5.2. International Vietnamese-French Research Laboratory on Mathematics and Applications

According to the agreement between the 3 parties - the Vietnam Academy of Science and Technology (VAST), the French National Center for Scientific Research (CNRS), and the Vietnam Institute for Advanced Study in Mathematics, on August 26, 2022, in Hanoi, the International France - Vietnam Research Laboratory in Mathematics and its Applications (IRL FVMA) was established. The International Research Laboratory will officially come into operation on January 1, 2023, with the headquarters located at the Vietnam Institute for Advanced Study in Mathematics, which is a continuation of Franco-Vietnamese mathematical cooperation activities for many years.

In 2022, some activities of VIASM were sponsored by the LIA VN fund, the forerunner of the IRL FVMA, such as cryptography and application summer school and the autumn course of Prof. Christine Thomas-Agnan...

6. Facilities

The new Institute's headquarter has been officially operated at 157 Chua Lang Street since April 2020 (it will take until January 2021 to complete the project), with a total area of nearly 2000 square meters. In 2022, the headquarters of the Institute were operated synchronously and stabilised, meeting the Institute's activities. The project "*Strengthening information technology equipment and infrastructure for digital transformation to improve the quality of training, teaching, and research at the Institute for Advanced Studies in Mathematics*" is currently being implemented for completion. It is expected that the project will be completed, the Institute will have modern technical facilities, and it will meet the operation of a research institute according to international standards.

In 2022, the Library provided valuable scientific materials with more than 1400 books and academic journals to serve researchers, guests, and students coming to study and work at the Institute.

Softwares for managing registration and considering researchers, rewarding mathematical works, and registering and organizing conferences, have been put into use many years ago. Besides, in 2022, to promote digital transformation and prepare for the activities of the Mathematics Program in the 2021–2030 period, the Institute have carry out construction and upgraded a digital knowledge system for Math scientists, including:

- Upgrading the NPDM Website into NPDM Web Portal;
- Updating the Math assignment and grading system (Webworks);

- Database of Vietnamese mathematicians at home and abroad: automatically collecting publications on Mathematics; Collecting, managing, and exploiting information by mathematicians; Display the network of Vietnamese mathematicians.

In addition, the Institute is also in the process of managing and updating the Vietnam Mathematics Web Portal (Mathematics Program website and three websites for Applied Mathematics orientations: Applied mathematics - Operational Science Network, Applied Statistics Network, Artificial Intelligence and Data Science).

7. Budget

In 2022, The Institute received 26.606 million VND from the public budget for operation, including:

- The budget of the Institute's regular tasks was 15.600 million VND.
- The budget for the implementation of tasks of the National Program for the Development of Mathematics in the period of 2021-2030: 11,006 million VND, including:
 - + Science and technology career funding for the implementation of tasks of the National Program for the Development of Mathematics in the period of 2021-2030, to be implemented in 2022: 900 million VND.
 - + Education and Training Funding for the Implementation of tasks of the National Program for the Development of Mathematics in the period of 2021-2030 implemented in 2022: 10,106 million VND.

RESEARCH GROUPS AND RESEARCH FIELDS

1. Researcher

In 2022, there were 97 researchers working at VIASM. Among which 88 researchers stayed from two to six months, 9 postdoctoral fellows stayed for 12 months.

Among 97 researchers, there were 48 mathematicians from Hanoi and 25 from other locations within Vietnam; 14 Vietnamese mathematicians abroad and 10 foreigners, 78 from universities and 19 from research institutes;

The names of 97 research fellows and 10 visitor scholars are listed on pages 80-86.

2. Students

In 2022, The Institute supported 12 graduate students and young researchers to work on projects with research groups (for the period from one week to three months). In which, there were 6 students from Hanoi, 4 students from provinces outside Hanoi, 1 overseas Vietnamese and 1 foreigner.

3. Research groups

Organizing research groups is one of the main tasks of the Institute. Scientists in the same field work together at the Institute on a short-term time basis. They are Vietnamese mathematicians in the country and from abroad as well as prominent international mathematicians. This form of activity is expected to consolidate the research branches already rooted in Vietnam as well as to lay foundations for the formation of new branches of Mathematics.

In 2022, VIASM invited 25 research groups and 14 individuals (postdoctoral research) in the six following fields:

- Algebra - Number Theory - Geometry - Topology;
- Analysis;
- Differential Equations and Dynamical Systems;
- Optimization and Scientific Computing;
- Probability - Statistics;
- Applied Mathematics.

Below is a list of research groups and individuals, postdoctoral fellows.

Algebra - Number Theory - Geometry - Topology: There were 11 following groups and 5 individuals:

3.1. “*Selected problems in associative algebra*”: Prof. Dr Sci. Pham Ngoc Anh’s group consisted of 3 members:

- Prof. Dr Sci. Pham Ngoc Anh, Hungarian Academy of Sciences;
- Dr. Trinh Thanh Deo, VNUHCM - University of Science (1 month);
- Dr. Ngo Tan Phuc, Dong Thap University (3 months)

worked 2.5 months (from October to December 2022).

3.2. “*On the Kuznetsov trace formulae*”: Dr. Do Viet Cuong’s group consisted of 3 members:

- Dr. Do Viet Cuong, VNU - University of Science;
- Dr. Dao Phuong Bac, VNU - University of Science;
- Dr. Ngo Trung Hieu, Hanoi University of Science and Technology

worked for 4 months (from January to April 2022).

3.3. “*Motivic Integration, Lipschitz Geometry and Singularity Theory*”: Dr. Nguyen Hong Duc’s group consisted of 5 members and 1 intern:

- Dr. Nguyen Hong Duc, Thang Long University (from March to July 2022);
- Dr. Pablo Portilla Cuadrado, Université Lille, France (1.5 months)
- Dr. Nguyen Xuan Viet Nhan, Basque Center for Applied Mathematics - BCAM, Spain (4 months);
- Prof. Guillermo Peñafort Sanchis, Universitat de València, Spain (1.25 months);
- Assoc Prof. Dr. Le Quy Thuong, VNU - University of Science (4 months);
- Dr. Tran Quang Tue, Phenikaa University (Intern)

worked for 4 months (from March to June 2022).

3.4. “*Algebraic structures of constacyclic codes over finite rings and applications*”: Prof. Dinh Quang Hai consisted of 7 members, 1 visitors and 5 interns:

- Prof. Dinh Quang Hai, Kent State University, USA;
- Dr. Nguyen Trong Bac, University of Economics and Business Administration - Thai Nguyen University (4 months);
- Dr. Tushar Bag, Indian Institutes of Technology;
- Dr. Tran Hoai Ngoc Nhan, Vinh Long University of Technology Education (4 months);
- Assoc Prof. Dr. Truong Cong Quynh, University of Technology and Education - University of Da Nang (4 months);
- Assoc Prof. Dr. Abhay Kumar Singh, Indian Institutes of Technology;
- Prof. Le Van Thuyet, Hue University of Education (4 months);
- Dr. Han Mao Kiah, School of Physical and Mathematical Sciences, Singapore (Visitor);
- Nguyen Thi Diem Chi, Pham Phu Thu High School (Intern, 2 months)
- Truong Thi Hai Duyen, Hanoi Pedagogical University 2 (Intern, 2.25 months);
- Nguyen Thi Nga, Vinh University (Intern, 2.25 months);
- Dao Thi Trang, HCMC University of Food Industry (Intern, 2.5 months);
- Dr. Bhanu Pratap Yadav, Indian Institutes of Technology (Intern, 1.5 months)

worked for 2 months (from May to July 2022).

3.5. *“Some algebraic properties and invariants of standard graded algebras”*: Dr. Tran Quang Hoa’s group consisted of 2 members:

- Dr. Tran Quang Hoa, Hue University of Education;
- Dr. Nguyen Dang Hop, Institute of Mathematics - VAST

worked for 4 months (from May to August 2022).

3.6. *“Representations and characters of finite groups”*: Assoc Prof. Dr. Nguyen Ngoc Hung’s group consisted of 3 members:

- Assoc Prof. Dr. Nguyen Ngoc Hung, Akron University , USA;
- Dr. Hung P. Tong - Viet, Binghamton University, USA (1 month);
- Dr. Bui Anh Tuan, VNU HCM - University of Science (1 month)

worked for 1.75 months (from July to August 2022).

3.7. “*Irreducible representations of Leavitt path algebras and some related problems*”: Dr. Tran Giang Nam’s group consisted of 4 members, 1 visitor and 1 intern:

- Assoc Prof. Dr. Tran Giang Nam, Institute of Mathematics - VAST;
- Prof. Roozbeh Hazrat, Western Sydney University (2 months);
- Assoc Prof. Dr. Vu The Khoi, Institute of Mathematics - VAST (2 months);
- Dr. Ho Minh Toan, Institute of Mathematics - VAST (2 months);
- Dr. Le Hoang Mai, Dong Phap University (Visitor, 1 month);
- MSc. Nguyen Dinh Nam, Ha Tinh University & Institute of Mathematics - VAST (Intern)

worked for 4 months (from August to November 2022).

3.8. “*Some perturbation problems in local algebra*”: Assoc Prof. Dr. Pham Hung Quy’s group consisted of 3 members:

- Assoc Prof. Dr. Pham Hung Quy, FPT University;
- Assoc Prof. Dr. Doan Trung Cuong, Institute of Mathematics - VAST (3 months);
- Dr. Duong Thi Huong, Thang Long University (3 months);

worked for 4 months (from March to June 2022).

3.9. “*Pluripotential Theory and Applications to Complex Geometry and Dynamics*”: Prof. Dr Sci. Do Duc Thai and Dr. To Tat Dat’s group consisted 5 members, 1 visitor and 1 intern:

- Prof. Dr Sci. Do Duc Thai, Hanoi National University of Education;
- Dr. To Tat Dat, Sorbonne University, France (3 months);
- Dr. Do Thai Duong, Institute of Mathematics - VAST (2 months);
- Dr. Huynh Dinh Tuan, Hue University of Education (2 months);
- Dr. Nguyen Van Thien, FPT University (2 months);
- Dr. Vu Duc Viet, University of Cologne, Germany (Visitor, 9 days);
- Nghiem Tran Trung, University of British Columbia, Canada (Intern, 2 months)

worked for 3 months (from July to September 2022).

3.10. “*Alexander complex and topology of polynomial mappings*”: Dr. Nguyen Tat Thang’s group consisted of 3 members, 2 visitors and 2 interns:

- Dr. Nguyen Tat Thang, Institute of Mathematics - VAST;
- Prof. Dr Sci. Phung Ho Hai, Institute of Mathematics - VAST (2 months);
- Dr. Dinh Si Tiep, Institute of Mathematics - VAST;
- Dr. Dang Tuan Hiep, Dalat University (Visitor, 1 month);
- Prof. Pham Tien Son, Dalat University (Visitor, 1 week);
- MSc. Vo Quoc Bao, Institute of Mathematics - VAST (Intern);
- Nguyen Khanh Hung, Institute of Mathematics - VAST (Intern)

worked for 3 months (from April to June 2022).

3.11. “*Depth and regularity of the integral closure of powers of monomial ideals*”: Dr. Tran Nam Trung’s group consisted of 5 members:

- GS. TSKH. Phạm Ngọc Ánh, Viện Hàn lâm Khoa học Hungary;
- Dr. Tran Nam Trung, Institute of Mathematics - VAST;
- Dr. Le Xuan Dung, Hong Duc University (2 months);
- Dr. Truong Thi Hien, Hong Duc University;
- Prof. Dr Sci. Le Tuan Hoa, Institute of Mathematics - VAST;
- Dr. Nguyen Thu Hang, University of Science, Thai Nguyen University (2 months)

worked for 3 months (from March to May 2022).

Postdoc fellows:

- Dr. Jorge Cely, a postdoc fellow, worked for 6 months in 2022 (from July 2022 to June 2023) on “*Motivic integration and connections with representation theory*”;
- Dr. Do Trong Hoang, Hanoi University of Science and Technology, a postdoc fellow, worked for 6 months in 2022 (from July 2021 to June 2022) on “*Cohomological properties of binomial ideals*”;
- Dr. Dang Quoc Huy, a postdoc fellow, worked for 10 months in 2022 (from November 2021 to October 2022) on “*Moduli space of Galois covers (of curves)*”;
- Dr. Trinh Duy Tien, Hanoi National University of Education, a postdoc fellow, worked for 7 months in 2022 (from October 2021

to March 2022 and September 2022 to February 2023) on “*Fourier coefficients of automorphic forms*”;

- Dr. Pham Van Thang, VNU - University of Science, a postdoc fellow, worked for 12 months (from January 2022 to December 2022) on “*Erdos and Falconer Distance Conjectures, Restriction Theory, Incidence Geometry, and Connections Erdos and Falconer Distance Conjectures, Restriction Theory, Incidence Geometry, and Connections*”.

Analysis: There were 3 following research groups and 3 individuals:

3.12. “*Semi-classical Analysis For system of Pseudo-differential Operator*”: Prof. Mouez Dimassi and Prof. Fujie Setsuro’s group consisted of 2 members and 1 visitor:

- Prof. Mouez Dimassi, Bordeaux Université, France;
- Prof. Fujie Setsuro, Ritsumeikan University, Japan;
- Dr. Higuchi Kenta, Ehime University, Japan (Visitor, 10 days)

worked for 2 months (from September to November 2022).

3.13. “*Functional Inequalities with weights: new approaches, results and applications*”: Dr. Nguyen Tuan Duy and Dr. Lam Hoang Nguyen’s group consisted of 3 members:

- Dr. Nguyen Tuan Duy, University of Finance - Marketing;
- Dr. Lam Hoang Nguyen, Memorial University of Newfoundland, Canada;
- Dr. Dao Nguyen Anh, University of Economics HCMC

worked for 2 months (from May to June 2022).

3.14. “*Some selected problems in fractional integro-differential equations, integral inequalities theory and their applications*”: Assoc Prof. Dr. Dinh Thanh Duc’s group consisted of 3 members and 1 visitor:

- Assoc Prof. Dr. Dinh Thanh Duc, Quy Nhon University;
- Dr. Tran Dinh Phung, University of Finance - Marketing (3 months);
- Prof. Vu Kim Tuan, University of West Georgia, USA (1.25 months)
- Dr. Vo Thi Bich Khue, University of Finance - Marketing (Visitor, 17 days)

worked for 3 months (from July to September 2022).

Individuals:

- Prof. Dr. Sci. Nguyen Viet Anh, Université de Lille (France), worked for the Institute for 1 month (from July to August 2022) on “*Generalized Lelong numbers of positive pluriharmonic currents*”;
- Assoc Prof. Dr. Luong Dang Ky, Quy Nhon University, worked for 1 month in 2022 (from November 2021 to January 2022) on “*On some problems in Harmonic analysis and Operator theory*”;
- Dr. Pham Viet Hai, Hanoi University of Science and Technology, a postdoc fellow, worked for 6 months (from July to December 2022) on “*Operators and semigroups of operators on function spaces*”.

Differential Equations and Dynamical Systems: There were 5 following groups:

3.15. “*Robust Stability of Ordinary and Partial Differential Systems*”: Prof. Nguyen Huu Du’s group consisted of 6 members, 1 visitor:

- Prof. Nguyen Huu Du, VNU - University of Science;
- Assoc Prof. Dr. Vo Hoang Hung, Saigon University (4 months);
- Dr. Nguyen Thu Ha, Electric Power University (4 months);
- Prof. Keonhee Lee, Chungnam National University, South Korea (2.75 months);
- Dr. Nguyen Thanh Nguyen, Chungnam National University, South Korea (2.75 months);
- Dr. Nguyen Ngoc Thach, Chungnam National University, South Korea (3 months);
- Assoc Prof. Dr. Jihoon Lee, Chungnam National University, South Korea (Visitor, 0.75 months)

worked for 4 months (from May 2022 to August 2022).

3.16. “*PDEs in physics and geometry*”: Dr. Trinh Viet Duoc and Prof Assoc. Dr. Ngo Quoc Anh’s group consisted of 5 members:

- Dr. Trinh Viet Duoc, VNU - University of Science;
- Assoc Prof. Dr. Ngo Quoc Anh, VNU - University of Science;

- Prof. Chérif Amrouche, Université de Pau et des Pays de l'Adour, France (1.5 months);
- Dr. Nguyen Van Hoang, FPT University;
- Prof. Phan Thanh Nam, Ludwig Maximilian University of Munich, Germany (1 month)

worked for 4 months (from August to November 2022).

3.17. “*Some qualitative problems in stability analysis and control of singular dynamical systems*”: Prof Assoc. Dr. Le Van Hien’s group consisted of 2 members:

- Assoc Prof. Dr. Le Van Hien, Hanoi National University of Education;
- Assoc Prof. Dr. Do Duc Thuan, Ha Hoi University of Science and Technology (1 month)

worked for 2 months in 2022 (from December 2021 to February 2022).

3.18. “*Qualitative theory for certain classes of evolution equations and fluid dynamics*”: Assoc Prof. Dr Sci. Nguyen Thieu Huy’s group consisted of 4 members:

- Assoc Prof. Dr Sci. Nguyen Thieu Huy, Hanoi University of Science and Technology;
- Dr. Vu Thi Ngoc Ha, Hanoi University of Science and Technology;
- Dr. Tran Thi Kim Oanh, Hanoi University of Science and Technology;
- Dr. Pham Truong Xuan, Thuy Loi University

worked for 1 month in 2022 (from November 2021 to January 2022).

3.19. “*Some algebraic and analytic aspects of solutions of differential equations*”: Dr. Vo Ngoc Thieu’s group consisted of 3 members and 2 visitors:

- Dr. Vo Ngoc Thieu, Ton Duc Thang University;
- Dr. Ha Van Hieu, VNUHCM - University of Economics and Law;
- Dr. Tran Thi Hieu Nghia, Ho Chi Minh City University of Education;
- Prof. Dr Sci. Do Ngoc Diep, Thang Long University (Visitor, 15 days);

- Assoc Prof. Dr. Le Anh Vu, VNU HCM - University of Economics and Law (Visitor)

worked for 2 months (from June to July 2022).

Optimization and Scientific Computation: There were 2 following groups and 2 individuals:

3.20. “*Convergence Rates of Projection-Type Algorithms for Strongly Pseudo-Monotone Variational Inequalities and Equilibrium Problems*”: Prof. Dr Sci. Pham Ky Anh’s group consisted of 2 members:

- Prof. Dr Sci. Pham Ky Anh, VNU - University of Science;
- Dr. Trinh Ngoc Hai, Hanoi University of Science and Technology

worked for 1 month in 2022 (from November 2021 to January 2022).

3.21. “*Some Investigations on Game Theory, Conic Programming, and Mathematical Economics*”: Prof. Dr Sci. Nguyen Dong Yen’s group consisted of 1 member:

- Dr. Tran Van Nghi, Hanoi Pedagogical University 2

worked for 3 months (from October to December 2022).

Individuals:

- Dr. Le Van Hien, Ha Tinh University, a postdoc fellow, worked for 4 months in 2022 (from September 2022 to August 2023) on “*Constraint Qualifications, Optimality Conditions for Conic Programming and applications*”;
- Dr. Nguyen Thi Van Hang, Institute of Mathematics - VAST, a postdoc fellow, worked for 9 months in 2022 (from October 2021 to September 2022) on “*Second-Order Variational Analysis for Composite Models with Applications to Optimization and Stability*”.

Probability - Statistics: There were 1 following group and 3 individuals:

3.22. “*Deep learning based time series analysis for financial and economic modelling*”: Assoc Prof. Dr. Tran Minh Ngoc’s group consisted of 2 members and 1 intern:

- Assoc Prof. Dr. Tran Minh Ngoc, Sydney University, Australia;
- Dr. Ta Quoc Bao, VNUHCM - International University;

- Nguyen Thi Hien, Thuongmai University (Intern) worked for 2 months (from July to August 2022).

Individuals:

- Dr. Luu Hoang Duc, Institute of Mathematics - VAST, worked for 2 months (from June to August 2022) on “*Rough path theory and applications*”;
- Assoc Prof. Dr. Ngo Hoang Long, Hanoi National University of Education, worked for 1 month (October 2022) on “*Numerical methods for Stochastic differential equations with non-Lipschitz coefficients*”;
- Dr. Trinh Thi Huong, Thuongmai University, a postdoc fellow, worked for 4 months in 2022 (from September 2022 to February 2023) on “*Marginal effects in compositional regression models with a compositional functional covariate and applications*”.

Applied Mathematics: There were 3 following groups and 1 individual:

3.23. “*Approximation of some high-dimensional problems by deep neural networks*”: Prof. Dr Sci. Dinh Dung’s group consisted of 3 members:

- Prof. Dr Sci. Dinh Dung, VNU - Institute of Information Technology;
- Assoc Prof. Dr. Pham Thanh Duong, Vietnamese - German University (2 months);
- Dr. Nguyen Van Kien, University of Transport and Communications (2 months)

worked for 1 month in 2022 (from November 2021 to January 2022).

3.24. “*High Performance Computing for Solving the Shallow Water Flows and Transport Equations*”: Dr. Ong Thanh Hai’s group consisted of 2 members:

- Dr. Ong Thanh Hai, VNU HCM - University of Science;
- Dr. Le Anh Ha, VNU HCM - University of Science

worked for 2 months (from August to September 2022).

3.25. “*Design of event-triggered state observers aided by machine learning algorithms for some class of uncertain dynamical systems with time delays*”

and external disturbances”: Assoc Prof. Dr. Dinh Cong Huong’s group consisted of 2 members and 1 intern:

- Assoc Prof. Dr. Dinh Cong Huong, Quy Nhon University;
- Dr. Le Thanh Hieu, Quy Nhon University;
- Dao Thi Hai Yen, Quy Nhon University (Intern)

worked for 2 months (from November 2021 to January 2022).

Individual:

- Dr. Nguyen Thanh Phuong, The University of L’Aquila (Italy), worked for 1.25 months (from July to August 2022) on *“Adversarial Machine Learning: On the Safeness of Recommender Systems for Software Engineering”*.

SCIENTIFIC ACTIVITIES

The regular scientific exchange of the Institute is weekly seminars organized by research groups.

Conferences and seminars are organized in association with the projects that research groups at the Institute are working on. This aims to promote the present research directions, and at the same time guide the way for young scientists, graduates and students in scientific research.

Within the framework of the NPDM 2021-2030, a number of training courses, summer schools, and knowledge dissemination activities for teachers, high school and college students were held.

Conferences/Workshops

In the year 2022, VIASM organized 7 conferences/workshops.

1. *Workshop on Asymptotic and Harmonic Analysis, Evolution Equations and Applications*

Time & Venue: January 18-19, 2022 at VIASM (hybrid).

Number of participants: 70.

The purpose of this workshop is to introduce some fundamental methods and approaches as well as recent developments in the fields of asymptotic and harmonic analysis, evolution equations and their applications. The conference was attended by professors and leading experts from four continents with different time zones: Asia, Europe, America, and Australia, as well as nearly 40 scientists, academics, PhD students, graduate students, and senior students. The conference also welcomed about 30 online participants, including undergraduates, graduate students, and local and international scholars.

2. *Workshop on Algebraic Geometry and Singularity Theory*

Time & Venue: April 24-26, 2022 at Tuan Chau, Quang Ninh.

Number of participants: 14.

The seminar was held by the VIASM in collaboration with Thang Long University and the VNUHN - University of Science. The conference has the participation of 11 delegates who are international mathematicians in the field of algebraic geometry and singularity.

3. Conference on implementation of the National Program for the Development of Mathematics in the 2021-2030 period for the Faculty of Mathematics in three regions

Time & Venue: May 19, 2022 at Quy Nhon University.

Number of participants: 24.

The Institute for Advanced Study in Mathematics (VIASM) and Quy Nhon University jointly organized a conference to implement the program for 03 departments of Mathematics: Faculty of Mathematics-Mechanics-Informatics of the University of Science - Vietnam National University Hanoi (VNUHN), Faculty of Mathematics and Informatics of University of Science - Vietnam National University Ho Chi Minh City (VNU HCMC) and Faculty of Mathematics and Statistics from Quy Nhon University (QNU).

The conference evaluated the results achieved in the Mathematic Program in 2021, discussed the implementation plan of the Mathematic Program in 2022, and agreed to build several joint coordination activities among the three faculties in the coming time.

Also at the conference, VIASM implemented Circular 22/2022/TT-BTC (referred to as Circular 22), which issued by the Ministry of Finance, guiding the management and use of recurrent expenditures for the National Program for the Development of Mathematics and creating favourable conditions for units to implement the program from 2021 through 2030.

4. Workshops on Coding Theory and related concepts

Time & Venue: July 4-8, 2022 at VIASM (hybrid).

Number of participants: 70.

The conference includes 5 invited reports from researchers from Vietnam, Singapore, India, and other countries. This workshop aims to introduce the basics of coding theory and related concepts to undergraduate students, postgraduates, and interested mathematicians in Vietnam, Southeast Asia, India, and other countries in Asia. It will also present to the audience many applications of coding theory, including cryptography (code-based cryptography), DNA computing (DNA codes), and quantum computation (quantum error-correcting codes).

5. Annual Meeting 2022

Time & Venue: August 30-31, 2022 at VIASM (hybrid).

Number of participants: 82.

Annual Meeting is one of the highlight scientific activities that the Institute holds each year. Lectures given at the Meetings mark the development of Vietnamese Mathematics through each stage.

Five lectures delivered at the Annual Meeting 2022 included: Prof. David Pointcheval (ENS Paris), Prof. Nguyen Huu Du (VNU - University of Science), Prof. John R. Birge (The University of Chicago Booth School of Business), Prof. Oscar Garcia-Prada (Institute of Mathematical Sciences, Madrid), Prof. Phan Van Tuoc (University of Tennessee – Knoxville).

6. Young Topologists Meeting

Time & Venue: November 21-25, 2022 at VIASM.

Number of participants: 25.

The conference was organized to connect and share the latest research results in the field of algebraic topology of domestic and foreign researchers. Since then, promoting the research cooperation of young topologists throughout the country. Besides, the conference is also an opportunity for students, postgraduates, and interested people to have the opportunity to approach new research directions from dynamic young topologists.

The conference had the participation of speakers: Assoc Prof. Dr. Nguyen Dang Ho Hai (Hue University of Science), Dr. Ngo Anh Tuan (VNU HN - University of Science), Dr. Nguyen The Cuong (VNU HN - University of Science), Prof. Hans-Werner Henn (University of Strasbourg, France), Dr. Bui Anh Tuan (VNU HCM - University of Science), Prof. Christian Ausoni (University of Paris 13, France), Prof. Antoine Touzé (University of Lille, France).

7. Workshop on The 25th Conference of the Oriental COCOSDA

Time & Venue: November 24-26, 2022 at VIASM.

Number of participants: 92.

The workshop was organized by the Association for Vietnamese Language and Speech Processing (VLSP) in collaboration with the Vietnam Institute for Advanced Study in Mathematics (VIASM). The workshop was first held in Hanoi in 2007. In 2022, the 25th Conference of the Oriental COCOSDA is returning to Hanoi for the second time with the purpose is to exchange ideas, share information and discusses regional matters on creation, utilization, dissemination of spoken language corpora of oriental languages and also on the assessment methods of speech recognition/synthesis systems as well as to promote speech research on oriental languages. In particular, the seminar had the participation of two world leading speakers: Prof. Haizhou

Li (University of Hong Kong & National University of Singapore) and Prof. Sakriani Sakti (Japan Institute of Science and Technology). The conference also received great attention from researchers from all over the world.

Special programs, Mini-courses

In 2022, VIASM organized 3 mini-courses and 4 specialized schools.

1. *Summer School on PDE and related topics*

Time & Venue: July 25-28, 2022 at VIASM.

Number of participants: 30.

Lecturers: Prof. Dinh Nho Hao (Institute of Mathematics -VAST), Prof. Dang Duc Trong (VNU HCM - University of Science), Dr. Duong Giao Ky (An Giang University, VNU HCM), Le Thi Thu Thuy (Research student, University of North Carolina-Charlotte, USA), Nguyen Trung Thanh (Rowan University, USA), Nguyen Hoang Loc (Northern University Carolina-Charlotte, USA)

In charge of expertise: Prof. Phan Van Tuoc (University of Tennessee-Knoxville), Prof. Tran Vinh Hung (University of Wisconsin-Madison)

2. Mini-course “*Generalized Lelong numbers for positive plurisubharmonic currents*”

Time & Venue: July 25-29, 2022 at VIASM.

Number of participants: 15.

Lecturer: Nguyen Viet Anh (Lille University, France).

3. Summer School “*The Mathematics of interacting Bose gases*”

Time & Venue: August 1-5, 2022 at VIASM (hybrid)

Number of participants: 86.

Lecturers: Phan Thanh Nam (LMU Munich, Germany), Nguyen Trong Toan (Penn State University, USA).

Tutor: Duong Giao Ky (An Giang University)

4. Summer School “*Group Theory and Representation Theory*”

Time & Venue: August 9-21, 2022 at VIASM.

Number of participants: 37.

Lecturers: Prof. Martin Liebeck (Imperial College London, UK), Prof. Gabriel Navarro (University of Valencia, Spain), Prof. Fernando Rodriguez Villegas (ICTP), Prof. Jay Taylor (University of Manchester, UK), Prof. Olivier Dudas (University of Paris 6, France).

5. *Summer School on Cryptography*

Time & Venue: August 24-30, 2022 at VIASM.

Number of participants: 79.

Lecturers: Prof. Damien Stehlé (Ecole Normale Supérieure de Lyon, France), Prof. David Pointcheval (Ecole Normale Supérieure de Paris, France), Prof. Phan Duong Hieu (Telecom Paris, Institut Polytechnique de Paris, France), Prof. Zhao Ni (University of Arizona, USA), Prof. Jian Guo (Nanyang Technological University, Singapore).

6. Mini – Course “*Stationary Stokes and Navier-Stokes Equations*”

Time & Venue: November 7-18, 2022 at VIASM.

Number of participants: 22.

Lecturer: Prof. Chérif Amrouche (Université de Pau et des Pays de l'Adour, France).

7. Mini Course “*Dynamical Systems*”

Time & Venue: November 21- December 2, 2022 at VIASM.

Number of participants: 30.

Lecture: Prof. Lee Keonhee (Chungnam National University, South Korea).

NPDM activities

On December 22, 2020, the Prime Minister signed Decision No. 2200/QĐ-TTg approving the National Program for the Development of Mathematics. VIASM continues to be the standing coordinator of the Program's activities.

VIASM has completed around 90% of the 2022 NPDM plan. Some of them had been reported to the Ministry of Education and Training to adjust.

1. Developing NPDM legal documents

- On March 30, 2022, the Ministry of Finance enacted Circular No.22/2022/TT-BTC as a guidance to supervise the usage of the frequent expenditures for the application of the NPDM during the period from 2021-2030.

- On December 30, 2022, the Minister of Education and Training issued Decision No. 4657/QĐ-BGDĐT promulgating the Regulation on the Outstanding Math Publications Award under the NPDM during the period from 2021-2030.

- Others are being drafted, including:

+ Working Regulations of the NPDM Executive Board.

+ Regulations on granting scholarships to students.

+ Regulations on administration of selecting researchers: continuing to comply with the directive signed and issued by the Scientific Director of VIASM until the Regulations of the Institute on organization and operation are updated.

2. Promoting communication on math knowledge

- Articles summarizing the NPDM during the period 2010-2020 and orientation on Mathematics in the 21st century have been written. We have been developing mathematical models to display at the VIASM and for media, as well as creating a series of products on various applications in life.

- Successfully organized 03 Math Open Day in Thua Thien-Hue, Gia Lai, Dong Thap with approximately 6000 attendees and 01 Math and Science School for students at ICISE, Quy Nhon.

3. Promoting high quality math publications

- 07 Ministry-level NPDM projects have been implemented since 2022; 10 Ministry-level NPDM projects have been approved for deployment from 2023.

- Making a draft of a project for the development of the Journal of Applied and Industrial Mathematics on the list of the pretentiously global journals (ECSI/Scopus) based on developing the Applied Mathematics Journal of Vietnam Mathematical Society.

4. Promoting applied mathematical research, focusing on developing high demand areas in the fourth industrial revolution

- Successfully organized 03 conferences cooperating between university/institute - the State - enterprises with more than 400 participants with the following topics: Fintech Forum; International Conference on Mathematical Modeling for climate change and environment; Conference on Block chain Computing.

5. Assisting the implementation of the high school education in Mathematics

VIASM has successfully organized the following events:

- 01 conference on teaching Probability and Statistics in high school with nearly 200 online and offline attendees.

- 02 training courses for Vietnam gifted high school math teachers with nearly 100 participants; 01 training course for over 200 teachers in primary school and 09 training courses for high school math teachers in Hanoi, Nghe An, Phu Yen, Binh Dinh, Thua Thien - Hue, Gia Lai, Dong Thap, Da Nang... with over 1000 participants.

- 01 Summer Camp on Mathematics and Stem for approximately 50 students, including 35 students from remote areas.

6. Supporting talent training and improving the quality of human resources in Mathematics

- Successfully organized 06 training courses/summer schools for about 800 students: 02 summer schools for high school for gifted students;

01 summer school for students and 04 mini-courses on recent topics in modern mathematics for students.

- Professional support for 02 competitions: Vietnam Math Olympiad and coordinated in training the team for the International Mathematical Olympiad - IMO 2022. As a result, the Vietnamese delegation won 2 gold medals, 2 silver medals and 2 bronze medals, in which one talented contestant owned a perfect score of 42/42 points.

- Fruitfully organized 04 lecture series on blockchains, operation research, Applied Statistics and Mathematical Analysis for more than 500 people.

- Successfully organized 03 training courses for nearly 300 lecturers in Mathematics and Statistics;

- Surveying, researching, updating and standardizing 03 standards of group training programs in Mathematics at undergraduate and graduate level: No longer implemented because the Department of Higher Education is the unit in charge of implementation and has implemented according to other plans and projects.

 - Developing the Math knowledge block in technical fields;

 - Developing regulations to implement scholarships for students majoring in Mathematics.

7. Building and developing the knowledge system of mathematical sciences in the digital Vietnamese knowledge system

- Upgraded the NPDM website; upgraded and added features to the database of Vietnamese mathematicians.

- Constructed a system of online exercises and assessment for Linear Algebra 2 subjects at university level.

- Developed 01 set of documents on some topics of practical experience in Mathematics in the direction of STEM education to be used as training materials for high school math teachers within NPDM.

- The materials, documents, journals are accessed and exploited (MathScinet system, SIAM,...).

- Translated 03 sets of documents for training and innovating teaching methods and introducing current research and application directions in Mathematics.

- Developed 01 set of documents including lectures and intensive arithmetic exercises as an in-depth reference for high school students specializing in Mathematics.

8. Building, consolidating and developing the VIASM and a number of strong Vietnam centers for research and application of Mathematics

- Successfully organized 03 Open Math Days in Quy Nhon, Hanoi and Ho Chi Minh City with more than 4,000 attendees and 02 series of public lectures for high schools in Ho Chi Minh City and surrounding areas.

9. Promoting international cooperation in math research, application and training

- Supported domestic scientists and organizations to become official members of 02 Associations to effectively exploit their resources and data: American Mathematical Society (AMS), Association Mathematics of America (MAA).

DANH SÁCH CÁC ÁN PHẨM VÀ TIỀN ÁN PHẨM

LIST OF PUBLICATION AND PREPRINTS 2022

Danh sách những công trình do các tác giả thực hiện toàn bộ hoặc một phần với sự tài trợ của Viện.

List of publications and preprints which were supported totally or partly by VIASM.

PUBLICATIONS:

Anh Nguyen Dao, Nguyen Lam, and Guozhen Lu, *Gagliardo-Nirenberg type inequalities on Lorentz, Marcinkiewicz and weak- L^1 spaces.*

Abstract. We establish the Gagliardo-Nirenberg inequality, Trudinger-Moser inequality and John-Nirenberg inequality using the Lorentz spaces $L^{p,\alpha}$, the Marcinkiewicz space $L^{q,\infty}$ and the weak- L^∞ space W introduced by Bennett, DeVore and Sharpley [Ann. of Math. (2) 113 (1981), pp. 601-611]. As consequences, we obtain the Gagliardo-Nirenberg type inequality with weak- L^∞ norm and BMO norm, Trudinger-Moser type inequality and John-Nirenberg type estimate with BMO norm and weak- L^1 norm.

P.K. Anh, T.N. Hai, V.T. Dung, *A gradient-like regularized dynamics for monotone equilibrium problems,* Differ. Equ. Dyn. Syst., Qual. Theory Dyn. Syst., 2022.

Abstract. In this paper, a gradient-like regularized dynamical system associated with a monotone equilibrium problem is studied. First, we give a rigorous proof of the existence and uniqueness of the strong global solution to the dynamical system. Then, we obtain strong convergence of the generated trajectories to a solution of the original equilibrium. A time discretization of the dynamical system provides a strongly convergent iterative regularization gradient-type method with relaxation parameters. Finally, the performance of the regularized dynamical system approach is illustrated by numerical experiments.

P.K. Anh, T.N. Hai, *Remark on a Tikhonov regularized forward-*

backward dynamical system associated with structured monotone inclusions, Viet. J. Math., 2022.

Abstract. Recently, a regularized forward-backward dynamical system associated with additively structured monotone inclusions involving a multi-valued maximally monotone operator \mathcal{A} and a single-valued co-coercive operator \mathcal{B} has been studied in Boţ et al. (Adv. Nonlinear Anal. 10, 450-476, 2021). In this work, we establish strong convergence of the generated trajectories to a solution of the original monotone inclusion under a weaker assumption on the operator \mathcal{B} , namely \mathcal{B} is Lipschitz continuous and such that the sum $\mathcal{S} := \mathcal{A} + \mathcal{B}$ is maximally monotone. It is well known that the co-coerciveness of \mathcal{B} implies its monotonicity and Lipschitz continuity, which in turn infers the maximal monotonicity of \mathcal{S} . If the operator $\mathcal{A} + \mathcal{B}$ is maximally monotone and strongly pseudomonotone, we obtain a convergence estimate. A time discretization of the dynamical system provides an iterative regularization forward-backward method with relaxation parameters. The performance of the regularized dynamical system approach is illustrated by numerical experiments.

P.K. Anh, T.N. Hài, *Dynamical system for solving bilevel variational inequalities*, J. Global Optim. 80 (4) (2021) 945 – 963.

Abstract. In this paper, we propose a new algorithm for solving bilevel variational inequalities. We consider a dynamical system and prove that the trajectory of this dynamical system converges to a desired solution.

P.K. Anh, T.N. Hai, *Remark on a Tikhonov regularized forward-backward dynamical system associated with structured monotone inclu-*

sions, Viet. J. Math.

Abstract. Recently, a regularized forward-backward dynamical system associated with additively structured monotone inclusions involving a multi-valued maximally monotone operator \mathcal{A} and a single-valued co-coercive operator \mathcal{B} has been studied in Boţ et al. (Adv. Nonlinear Anal. 10, 450-476, 2021). In this work, we establish strong convergence of the generated trajectories to a solution of the original monotone inclusion under a weaker assumption on the operator \mathcal{B} , namely \mathcal{B} is Lipschitz continuous and such that the sum $\mathcal{S} := \mathcal{A} + \mathcal{B}$ is maximally monotone. It is well known that the co-coerciveness of \mathcal{B} implies its monotonicity and Lipschitz continuity, which in turn infers the maximal monotonicity of \mathcal{S} . If the operator $\mathcal{A} + \mathcal{B}$ is maximally monotone and strongly pseudomonotone, we obtain a convergence estimate. A time discretization of the dynamical system provides an iterative regularization forward-backward method with relaxation parameters. The performance of the regularized dynamical system approach is illustrated by numerical experiments.

P.K. Anh, T.N. Hai, V.T. Dung, *A gradient-like regularized dynamics for monotone equilibrium problems*, Differ. Equ. Dyn. Syst. 24/3/2022; Qual. Theory Dyn. Syst.

Abstract. In this paper, a gradient-like regularized dynamical system associated with a monotone equilibrium problem is studied. First, we give a rigorous proof of the existence and uniqueness of the strong global solution to the dynamical system. Then, we obtain strong convergence of the generated trajectories to a solution of the original equilibrium. A time discretization of the dynamical system provides a

strongly convergent iterative regularization gradient-type method with relaxation parameters. Finally, the performance of the regularized dynamical system approach is illustrated by numerical experiments.

Pham The Anh, Adam Czornik, Thai Son Doan, Stefan Siegmund, *Proportional local assignability of dichotomy spectrum of one-sided continuous time-varying linear systems*, Journal of Differential Equations Volume 309,5 February 2022, Pages 176 – 195.

Abstract. We consider a local version of the assignment problem for the dichotomy spectrum of linear continuous time-varying systems defined on the half-line. Our aim is to show that uniform complete controllability is a sufficient condition to place the dichotomy spectrum of the closed-loop system in an arbitrary position within some Hausdorff neighborhood of the dichotomy spectrum of the free system using an appropriate timevarying linear feedback. Moreover, we assume that the norm of the matrix of the linear feedback should be bounded from above by the Hausdorff distance between these two spectra with some constant multiplier.

Pham The Anh, Artur Babiarz, Adam Czornik, Thai Aon Doan, *Proportional local assignability of the dichotomy spectrum of one-sided discrete time-varying linear systems*, *siam j. control optim* voi. 60, no. 3, pp. 1294-1319.

Abstract. We consider a problem of assignability of the dichotomy spectrum for one-sided discrete time-varying linear systems. Our purpose is to prove that uniform complete controllability is a sufficient condition for proportional local assignability of the dichotomy spectrum.

Dao Phuong Bac, *On some estimates and topological properties of relative orbits of subsets.*

Abstract. In this paper, we give some topological properties and estimates of orbit of certain subsets of K_v -points of varieties under actions of algebraic tori. These results are concerned with an analogue of Bruhat-Tits' question on the set of v -adic integral points of algebraic tori.

Dao Phuong Bac & Vu Tuan Hien, *On the topology of geometric and rational orbits for algebraic group actions over valued fields, II.*

Abstract. The aim of this paper is twofold. First, we show that if G is a smooth nilpotent group acting on an algebraic variety V defined over an admissible valued field k and $v \in V(k)$, then the Zariski closedness of the geometric orbit $G(k) \cdot v$ in $V(k)$ is equivalent to the Hausdorff closedness of the rational orbit $G(k).v$ in $V(k)$. Second, we provide some calculations for the fact that there is a bijection between the set of $G(k)$ -orbits and the kernel of the natural map in flat cohomology. These results are obtained in the framework of studying the rational orbits.

Nguyen Xuan Duy Bao, Phan Quoc Khanh, Nguyen Minh Tung, *On Necessary Optimality Conditions with HigherOrder Complementarity Slackness for Set-Valued Optimization Problems, Set-Valued and Variational Analysis*

Abstract. We aim to establish Karush-Kuhn-Tucker multiplier rules involving higher-order complementarity slackness under Hölder metric subregularity. These rules may be in the nonclassical form, i.e., their right-hand side is a supremum expression (instead of zero as in the

classical form). We consider a general problem setting of set-valued optimization and are interested in some typical types of solutions: weak, Henig-proper, positively-proper, and Borwein-proper solutions. To this end, we propose and apply a concept of a quasi-contingent derivative of index $\gamma \in [0, \infty]$ and define suitable critical directions. We impose generalized constraint qualifications of the Mangasarian-Fromovitz and Kurcyusz-Robinson-Zowe types to have nonvanishing objective multipliers. Our results are new or improve significantly recent existing ones.

Canh V. Pham, Quang C. Vu, Dung K. T. Ha, Tai T. Nguyen, Nguyen D. Le. *Maximizing k -submodular functions under budget constraint: applications and streaming algorithms.* Journal of Combinatorial Optimization, vol. 44, pages 723-751, 2022. (Impact factor: 1.26).

Abstract. Motivated by the practical applications in solving plenty of important combinatorial optimization problems, this paper investigates the Budgeted k -Submodular Maximization problem defined as follows: Given a finite set V , a budget B and a k -submodular function $f : (k + 1)^V \mapsto \mathbb{R}_+$, the problem asks to find a solution $\mathbf{s} = (S_1, S_2, \dots, S_k) \in (k + 1)^V$, in which an element $e \in V$ has a cost $c_i(e)$ when added into the i -th set S_i , with the total cost of \mathbf{s} that does not exceed B so that $f(\mathbf{s})$ is maximized. To address this problem, we propose two single pass streaming algorithms with approximation guarantees: one for the case that an element e has only one cost value when added to all i -th sets and one for the general case with different values of $c_i(e)$. We further investigate the performance of our algorithms in two applications of the problem, Influence Maximization with k topics and sensor placement of k types of measures. The experiment results indicate that our algorithms can return competitive results but require

fewer the number of queries and running time than the state-of-the-art methods.

Nguyen Tuan Duy, Nguyen Lam, Le Long Phi, *Some Hardy identities on half-spaces.*

Abstract. We prove some Hardy identities on the half-space \mathbb{R}_+^N . Our equalities imply corresponding versions of the Hardy type inequalities with exact remainder terms on \mathbb{R}_+^N . These equalities give straightforward understandings of the optimal constants as well as the nonexistence of nontrivial optimizers for various Hardy type inequalities on half-spaces. These identities also provide the "virtual"ground state in the sense of Frank and Seiringer [13] for several Hardy type inequalities on \mathbb{R}_+^N .

Van Dung Nguyen, Van Kien Nguyen, and Winfried Sickel, *s-Numbers of embeddings of weighted Wiener algebras,* Journal of Approximation Theory 279 (2022), 105745.

Abstract. In this paper we will study the asymptotic behaviour of certain widths of the embeddings $\mathcal{A}_\omega(\mathbb{T}^d) \rightarrow L_p(\mathbb{T}^d)$, $2 \leq p \leq \infty$, and $\mathcal{A}_\omega(\mathbb{T}^d) \rightarrow \mathcal{A}(\mathbb{T}^d)$, where $\mathcal{A}_\omega(\mathbb{T}^d)$ is the weighted Wiener class and $\mathcal{A}(\mathbb{T}^d)$ is the Wiener algebra on the d -dimensional torus \mathbb{T}^d . Our main interest will consist in the calculation of the associated asymptotic constant. As one of the consequences we also obtain the asymptotic constant related to the embedding of $C_{\text{mix}}^m(\mathbb{T}^d)$ into $L_2(\mathbb{T}^d)$ for Weyl and Bernstein numbers.

Dinh Dung, Vu Nhat Huy, *Approximation by linear combinations of translates of a single function,* Mathematical Inequalities & Appli-

cations, 25 (2022), 169-186.

Abstract. We study approximation of periodic functions by arbitrary linear combinations of n translates of a single function. We construct some linear methods of this approximation for univariate functions in the class induced by the convolution with a single function, and prove upper bounds of the L^p -approximation convergence rate by these methods, when $n \rightarrow \infty$, for $1 \leq p \leq \infty$. We also generalize these results to classes of multivariate functions defined as the convolution with the tensor product of a single function. In the case $p = 2$, for this class, we also prove a lower bound of the quantity characterizing best approximation of by arbitrary linear combinations of n translates of arbitrary function.

Duc-Manh Nguyen, *Topological veech dichotomy and tessellations of the hyperbolic plane*, israel journal of mathematics tbd (2022), 1-40 doi: 10.1007/ s11856-022-2320-8.

Abstract. For every half-translation surface with marked points (M, Σ) , we construct an associated tessellation $\Pi(M, \Sigma)$ of the Poincaré upper half plane whose tiles have finitely many sides and area at most π . The tessellation $\Pi(M, \Sigma)$ is equivariant with respect to the action of $\text{PSL}(2, \mathbb{R})$, and invariant with respect to (half-)translation covering. In the case (M, Σ) is the torus \mathbb{C}/\mathbb{Z}^2 with a one marked point, $\Pi(\mathbb{C}/\mathbb{Z}^2, \{0\})$ coincides with the iso-Delaunay tessellation introduced by Veech as both tessellations give the Farey tessellation. As application, we obtain a bound on the volume of the corresponding Teichmüller curve in the case (M, Σ) is a Veech surface (lattice surface). Under the assumption that (M, Σ) satisfies the topological Veech di-

chotomy, there is a natural graph \mathcal{G} underlying $\Pi(M, \Sigma)$ on which the Veech group Γ acts by automorphisms. We show that \mathcal{G} has infinite diameter and is Gromov hyperbolic. Furthermore, the quotient $\overline{\mathcal{G}} := \mathcal{G}/\Gamma$ is a finite graph if and only if (M, Σ) is actually a Veech surface, in which case we provide an algorithm to determine the graph $\overline{\mathcal{G}}$ explicitly. This algorithm also allows one to get a generating family and a "coarse" fundamental domain of the Veech group Γ .

Trinh Thanh Deo and Vo Thanh Chi, *On some ideal structure of leavitt path algebras with coefficients in integral domains*, international electronic journal of algebra doi: 10.24330/ieja.1229771

Abstract. In this paper, we present results concerning the structure of the ideals in the Leavitt path algebra of a (countable) directed graph with coefficients in an integral domain, such as, describing the set of generators for an ideal; the necessary and sufficient conditions for an ideal to be prime; the necessary and sufficient conditions for a Leavitt path algebra to be simple. Besides, some other interesting properties of ideal structure in a Leavitt path algebra are also mentioned.

D. C. Huong, T. N. Nguyen, H. T. Le, H. Trinh, *Event-triggered state estimation for nonlinear systems aid by machine learning*, asian journal of control, vol. 00, no. 0, pp. 1-12, month 2018, published online in wiley interscience (www.interscience.wiley.com) doi: 10.1002/asjc.0000.

Abstract. This paper considers the event-triggered state estimation problem with the aid of machine learning for nonlinear systems subject to external disturbances in the state and output vectors. First, we develop a recurrent neural network (RNN) learning algorithm to

predict the nonlinear systems. Second, we design a discrete-time event-triggered mechanism and a state observer based on this mechanism for the RNN model. This discrete-time event-triggered state observer significantly reduces the utilization of communication resources. Third, we establish a sufficient condition to ensure that the state observer can robustly estimate the state vector of the recurrent neural network. Finally, we provide an illustrative example to verify the merit of the proposed method.

Le Van Hien, *Finite-region boundedness and (Q, S, R) -dissipativity of 2-D singular Roesser systems with mixed time-varying delays*, Le Huy Vu, Vol. 6, 2022, pp. 2575 – 2580

Abstract. This paper investigates the finite-region boundedness (FRB) and stabilization problems for two-dimensional continuous-discrete linear Roesser models subject to two kinds of disturbances. For two-dimensional continuous-discrete system, we first put forward the concepts of finite-region stability and FRB. Then, by establishing special recursive formulas, sufficient conditions of FRB for two-dimensional continuous-discrete systems with two kinds of disturbances are formulated. Furthermore, we analyze the finite-region stabilization issues for the corresponding two-dimensional continuousdiscrete systems and give generic sufficient conditions and sufficient conditions that can be verified by linear matrix inequalities for designing the state feedback controllers which ensure the closed-loop systems FRB. Finally, viable experimental results are demonstrated by illustrative examples.

Dinh Cong Huong, Dao Thi Hai Yen, *State and disturbance simultaneous estimation for a class of nonlinear time-delay fractional-order*

system, Proceedings of the Institution of Mechanical Engineers, Part I: Journal of Systems and Control Engineering, 10.1177/09596518211046694 (2021), (SCIE).

Abstract. This article addresses the problem of estimating simultaneously the state and unknown disturbance of onesided Lipschitz fractional-order systems with time-delay. The nominal models of nonlinearities are assumed to satisfy both the one-sided Lipschitz condition and the quadratically inner-bounded condition. Different from the state observer reported in the literature, which only dealt with one-sided Lipschitz integer-order time-delay systems or nonlinear fractional-order time-delay systems where the nonlinear function satisfying Lipschitz condition, the state observers in this article can be applied to a wide class of nonlinear time-delay systems (one-sided Lipschitz fractional-order time-delay systems and one-sided Lipschitz integer-order time-delay systems). We employ the Razumikhin stability theorem and a recent result on the Caputo fractional derivative of a quadratic function to derive a sufficient condition for the asymptotic stability of the observer error dynamic system. The stability condition is obtained in terms of linear matrix inequalities, which can be effectively solved using the MATLAB LMI Control Toolbox. Two examples are provided to show the effectiveness of the proposed design approach.

Nguyễn Thị Thu Hương, Nguyễn Đông Yên, *Improperly efficient solutions in a class of vector optimization problems*, Journal of Global Optimization 82 (2022), no. 2, 375-387.

Abstract. Improperly efficient solutions in the sense of Geoffrion in linear fractional vector optimization problems with unbounded constraint

sets are studied systematically for the first time in this paper. We give two sets of conditions which assure that all the efficient solutions of a given problem are improperly efficient. We also obtain necessary conditions for an efficient solution to be improperly efficient. As a result, we have new sufficient conditions for Geoffrion's proper efficiency. The obtained results enrich our knowledge on properly efficient solutions in linear fractional vector optimization.

Nguyễn Thị Thu Hương, Nguyễn Đông Yên, *A new class of vector optimization problems with linear fractional objective criteria*, Journal of Applied and Numerical Optimization 4(2022), no. 1, 53-65.

Abstract. This paper studies a new class of vector optimization problems where the objective criteria are linear fractional functions, the ordering cone can be any nonempty closed convex pointed and solid cone, and the constraint set can be any nonempty closed convex set. Necessary optimality conditions, as well as sufficient optimality conditions, are obtained. In addition, two theorems on the connectedness of the weakly efficient solution set and the efficient solution set are established. The results are analyzed by concrete examples. (c)2022 Journal of Applied and Numerical Optimization.

Hop D. Nguyen and Quang Hoa Tran, *Powers of sums and their associated primes*, pacific journal of mathematics vol. 316, no. 1, 2022, viasm21.1.

Abstract. Let A and B be polynomial rings over a field k , and let $I \subseteq A$ and $J \subseteq B$ be proper homogeneous ideals. We analyze the associated primes of powers of $I + J \subseteq A \otimes_k B$ given the data on the summands. The associated primes of large enough powers of $I + J$ are

determined. We then answer positively a question due to I. Swanson and R. Walker about the persistence property of $I + J$ in many new cases.

Anup Biswas and Hoang-Hung Vo, *Liouville theorems for infinity laplacian with gradient and kpp type equation*, <https://doi.org/10.2422/2036-2145.202105050>

Abstract. In this paper, we prove new Liouville type results for a nonlinear equation involving infinity Laplacian with gradient of the form

$$\Delta_\infty^\gamma u + q(x) \cdot \nabla u |\nabla u|^{2-\gamma} + f(x, u) = 0 \quad \text{in } \mathbb{R}^d,$$

where $\gamma \in [0, 2]$ and Δ_∞^γ is a $(3 - \gamma)$ -homogeneous operator associated with the infinity Laplacian. Under the assumptions

$$\liminf_{|x| \rightarrow \infty} \lim_{s \rightarrow 0} f(x, s) / s^{3-\gamma} > 0$$

and q is a continuous function vanishing at infinity, we construct a positive bounded solution to the equation and if $f(x, s) / s^{3-\gamma}$ decreasing in s , we further obtain the uniqueness by improving sliding method for infinity Laplacian operator with nonlinear gradient. Otherwise, if $\limsup_{|x| \rightarrow \infty} \sup_{[\delta_1, \delta_2]} f(x, s) < 0$, then nonexistence result holds provided additionally some suitable conditions. To this aim, we develop novel techniques to overcome the difficulties stemming from the degeneracy of infinity Laplacian and nonlinearity of the gradient term. Our approach is based on a new regularity result, the strong maximum principle, and Hopf's lemma for infinity Laplacian involving gradient and potential. We also construct some examples to illustrate our results. We further investigate some deeper qualitative properties of the

principal eigenvalue of the corresponding nonlinear operator

$$\Delta_\infty^\gamma u + q(x) \cdot \nabla u |\nabla u|^{2-\gamma} + c(x)u^{3-\gamma},$$

with Dirichlet boundary condition in smooth bounded domains, which may be of independent interest. The results obtained here could be considered as sharp extension of the Liouville type results obtained in [1, 2, 11, 24, 48, 52].

D. Koh, S. Lee, T. Pham, and C-Y. Shen, *Configuration of rectangles in F_q^2* , *Finite Fields and Their Applications* 86 (2023): 102147.

Abstract. The main purpose of this paper is to provide threshold functions for the events that a random subset of the points of a finite vector space has certain properties related to point-flat incidences. Specifically, we consider the events that there is an ℓ -rich m -flat with regard to a random set of points in \mathbb{F}_q^n , the event that a random set of points is an m -blocking set, and the event that there is an incidence between a random set of points and a random set of m -flats. One of our key ingredients is a stronger version of a recent result obtained by Chen and Greenhill (2021).

J. H. Kim, B. Lund, T. Pham, and S. Yoo, *Threshold functions for incidence properties in finite vector spaces*, *Finite Fields and Their Applications*, 87, 102149.

Abstract. The main purpose of this paper is to provide threshold functions for the events that a random subset of the points of a finite vector space has certain properties related to point-flat incidences. Specifically, we consider the events that there is an ℓ -rich m -flat with regard to a random set of points in \mathbb{F}_q^n , the event that a random set of points

is an m -blocking set, and the event that there is an incidence between a random set of points and a random set of m -flats. One of our key ingredients is a stronger version of a recent result obtained by Chen and Greenhill (2021).

D. Koh, Q. Pham, and T. Pham, *Structural theorems on the distance sets over finite fields*, accepted in Forum Mathematicum, 2023.

Abstract. Let \mathbb{F}_q be a finite field of order q . Iosevich and Rudnev (2005) proved that for any set $A \subset \mathbb{F}_q^d$, if $|A| \gg q^{\frac{d+1}{2}}$, then the distance set $\Delta(A)$ contains a positive proportion of all distances. Although this result is sharp in odd dimensions, it is conjectured that the right exponent should be $\frac{d}{2}$ in even dimensions. During the last 15 years, only some improvements have been made in two dimensions, and the conjecture is still wide open in higher dimensions. To fill the gap, we need to understand more about the structures of the distance sets, the main purpose of this paper is to provide some structural theorems on the distribution of square and non-square distances.

Ngoc Khue Tran and Hoang-Long Ngo, *LAMN property for jump diffusion processes with discrete observations on a fixed time interval*. Journal of Statistical Planning and Inference, Volume 225, July 2023, Pages 1-28.

Abstract. We consider a one-dimensional stochastic differential equation with jumps driven by a Brownian motion and an independent Lévy process with finite Lévy measure, whose drift and diffusion coefficients depend on an unknown parameter. Under smoothness and non-degeneracy assumptions on the drift and diffusion coefficients and integrability assumption of jump size distribution, we prove the Local

Asymptotic Mixed Normality property when the solution process is observed discretely at high frequency on a fixed time interval. The proof is essentially based on Malliavin calculus techniques and an analysis of the jump structure of the Lévy process.

Rizwanur Khan, Djordje Milicevic, Hieu T. Ngo, *Nonvanishing of Dirichlet L -functions, II*, Mathematische Zeitschrift 300 (2022), 1603-1613.

Abstract. We show that for at least $\frac{5}{13}$ of the primitive Dirichlet characters χ of large prime modulus, the central value $L\left(\frac{1}{2}, \chi\right)$ does not vanish, improving on the previous best known result of $\frac{3}{8}$.

Hoang-Hung Vo, *Principal spectral theory of time-periodic nonlocal dispersal operators of Neumann type*, Mathematische Nachrichten, DOI: 10.1002/mana.201900474.

Abstract. In this communication, we prove some limits of the principal eigenvalue for nonlocal operator of Neumann type with respect to the parameters, which are significant in the understanding of dynamics of biological populations. We obtain a complete picture about limits of the principal eigenvalue in term of the large and small dispersal rate and dispersal range classified by "Ecological Stable Strategy" of persistence. This solves some open problems remaining in the series of work [3, 32, 30], in which we have to overcome the new difficulties comparing to [3, 32, 30] since principal eigenvalue of a nonlocal Neumann operator is not monotone with respect to the domain. The maximum principle for this type of operator is also achieved in this paper.

Luong Dang Ky, *Lower bound of hausdorff operators on the power*

weighted hardy spaces, (elemath - mathematical inequalities & applications: lower bound of hausdorff operators on the power weighted hardy spaces)

Abstract. Let $\alpha > -1$ and let φ be a measurable function on $(0, \infty)$ such that $\int_0^\infty t^\alpha |\varphi(t)| dt < \infty$. Denote by $H_{|\cdot|^\alpha}^1(\mathbb{R})$ the power weighted Hardy space associated with the power weight $|x|^\alpha$ and \mathcal{H}_φ the Hausdorff operator associated with the kernel φ . Recently, it was showed in [11] that there is a constant $C > 0$ such that

$$\|\mathcal{H}_\varphi\|_{H_{|\cdot|^\alpha}^1(\mathbb{R}) \rightarrow H_{|\cdot|^\alpha}^1(\mathbb{R})} \leq C \int_0^\infty t^\alpha |\varphi(t)| dt.$$

In this paper, we give a lower bound of $\|\mathcal{H}_\varphi\|_{H_{|\cdot|^\alpha}^1(\mathbb{R}) \rightarrow H_{|\cdot|^\alpha}^1(\mathbb{R})}$ by proving that

$$\left| \int_0^\infty t^\alpha \varphi(t) dt \right| \leq \|\mathcal{H}_\varphi\|_{H_{|\cdot|^\alpha}^1(\mathbb{R}) \rightarrow H_{|\cdot|^\alpha}^1(\mathbb{R})} \leq \int_0^\infty t^\alpha |\varphi(t)| dt$$

Hai, P.V.; Severiano, O. R; *Complex symmetric weighted composition operators on Bergman spaces and Lebesgue spaces*; Anal. Math. Phys. 12, No. 2, Paper No. 43, 33 p. (2022).

Abstract. In the paper, we investigate weighted composition operators on Bergman spaces of a half-plane. We characterize weighted composition operators which are hermitian and those which are complex symmetric with respect to a family of conjugations. As it turns out, weighted composition operators enhanced by a symmetry must be bounded. Hermitian, and unitary weighted composition operators are proven to be complex symmetric with respect to an adapted and highly relevant conjugation. We classify which the linear fractional functions give rise to the complex symmetry of bounded composition operators.

We end the paper with a natural link to complex symmetry in Lebesgue space.

Hoa T. B. Ngo; Mohsen Razzaghi; Thieu N. Vo; *Fractional-order Chelyshkov wavelet method for solving variable-order fractional differential equations and an application in variable-order fractional relaxation system*; Numerical Algorithms (2022).

Abstract. We give an efficient numerical approach to solve variable-order fractional differential equations (VO-FDEs) by applying fractional-order generalized Chelyshkov wavelets (FOGCW). The beta function is used to determine the exact value for the Riemann-Liouville fractional integral operator of the FOGCW. The exact value and the given wavelets are used to solve the VO-FDEs. Six examples are included to demonstrate the effectiveness of this method. In the last example, we show the application of our method to the variable-order fractional relaxation model.

Le Trung Hieu, P. H. A. Ngoc, T. B. Tran, N. D. Huy (2022), *Explicit criteria for exponential stability in mean square of stochastic difference systems with delays*, ima journal of mathematical control and information, oxford academic.

Abstract. By a novel approach, we present some new criteria for the exponential stability in mean square of solutions of non-linear stochastic difference systems with time-varying delays. A discussion of the obtained results is given. Illustrative examples and simulations are provided.

Nguyen Thi Thu Huong, Nguyen Nhu Thang, and Pham Anh

Toan, *Structural Stability of Autonomous Semilinear Nonlocal Evolution Equations and the Related Semi-dynamical Systems*. Vietnam J. Math. (2022).

Abstract. Our work firstly investigates the unique existence and the continuous dependence (on the singular kernel and initial data) of solutions to nonlocal evolution equations on Hilbert spaces. Secondly, we prove the well-definedness of a related semi-dynamical system consisting of Lipschitz continuous mappings in the space of continuous functions by constructing a metric utilizing the kernel of nonlocal derivative. Our results extend and generalize the existing results on Caputo fractional differential equations, namely the stability and structural stability results in Diethelm and Ford (J. Math. Anal. Appl. 265, 229-248, 2002), the related semidynamical systems in Son and Kloeden (Vietnam J. Math. 49, 1305-1315, 2021), to the case of nonlocal differential equations.

Phung Ho Hai and Joao Pedro dos Santos, *Finite torsors on projective schemes defined over a discrete valuation ring*. Algebraic Geometry 10 (1) (2023) 1-40 doi:10.14231/AG-2023-001.

Abstract. Given a Henselian and Japanese discrete valuation ring A and a flat and projective A -scheme X , we follow the approach of Biswas and dos Santos [J. Inst. Math. Jussieu 10 (2011), no. 2, 225-234] to introduce a full subcategory of coherent modules on X which is then shown to be Tannakian. We then prove that, under normality of the generic fibre, the associated affine and flat group is pro-finite in a strong sense (so that its ring of functions is a Mittag-Leffler A -module) and that it classifies finite torsors $Q \rightarrow X$. This establishes an anal-

ogy to Nori's theory of the essentially finite fundamental group. In addition, we compare our theory with the ones recently developed by Mehta-Subramanian and Antei-Emsalem-Gasbarri. Using the comparison with the former, we show that any quasi-finite torsor $Q \rightarrow X$ has a reduction of the structure group to a finite one.

D. C. Huong, V. T. Huynh, H. Trinh, *Design of event-triggered interval functional observers for systems with input and output disturbances.*

Abstract. Design of event-triggered functional observers for linear systems subject to input and output disturbances is presented in this paper. A new dynamic event-triggered mechanism is first proposed and then a novel event-triggered interval functional observer is designed. The designed observer provides upper and lower bounds of the unknown linear function of the state vectors. By constructing a Lyapunov function, conditions ensuring the existence of the event-triggered functional observer are established. The smallest bound of the estimated error and an effective algorithm for determining observer matrices are also presented. Finally, the obtained results in this paper are used to estimate linear functions of the state vector of a battery and motor circuit model of electric vehicles.

Dinh Cong Huong and Dao Thi Hai Yen, *State and disturbance simultaneous estimation for a class of nonlinear time-delay fractional-order systems.*

Abstract. This article addresses the problem of estimating simultaneously the state and unknown disturbance of onesided Lipschitz fractional-order systems with time-delay. The nominal models of nonlinearities

are assumed to satisfy both the one-sided Lipschitz condition and the quadratically inner-bounded condition. Different from the state observer reported in the literature, which only dealt with one-sided Lipschitz integer-order time-delay systems or nonlinear fractional-order time-delay systems where the nonlinear function satisfying Lipschitz condition, the state observers in this article can be applied to a wide class of nonlinear time-delay systems (one-sided Lipschitz fractional-order time-delay systems and one-sided Lipschitz integer-order time-delay systems). We employ the Razumikhin stability theorem and a recent result on the Caputo fractional derivative of a quadratic function to derive a sufficient condition for the asymptotic stability of the observer error dynamic system. The stability condition is obtained in terms of linear matrix inequalities, which can be effectively solved using the MATLAB LMI Control Toolbox. Two examples are provided to show the effectiveness of the proposed design approach.

Dinh Cong Huong, Hieu Trinh, *Event-triggered state estimation for recurrent neural networks with unknown time-varying delays.*

Abstract. We consider the problem of event-triggered state estimation for recurrent neural networks subject to unknown time-varying delays by proposing a robust dynamic event-triggered state observer. A method based on a novel state observer and a dynamic event-triggered mechanism (ETM) is proposed to provide robust state estimation of the delayed recurrent neural networks. The significance of the new dynamic ETM is that it helps to reduce unnecessary transmissions from the sensors to the observer. A sufficient condition for the existence of the dynamic event-triggered state observer in terms of a convex optimization problem is proposed based on Lyapunov theory combined

with free-weighting matrix technique and some useful inequalities such as Wirtinger-based integral inequality, Cauchy matrix inequality and reciprocally convex combination inequality. The effectiveness of the proposed estimation method is demonstrated by two numerical examples and simulation results. In contrast to the event-triggered state estimation methods currently available in the literature, which require that the time delays are constant or unknown time-varying but must be differentiable and event-triggered conditions depend on continuous supervisions, the one in this article only requires the information of upper and lower bounds of the unknown time-varying delays and the event-triggered conditions depend on discrete supervisions, which provides more practicality and potential saving in network bandwidth.

Thanh Hieu Le and Thi Ngan Nguyen, *Simultaneous diagonalization via congruence of hermitian matrices: some equivalent conditions and a numerical solution.*

Abstract. This paper aims at solving the Hermitian SDC problem, which is the simultaneous diagonalization via-congruence of a finite collection of Hermitian matrices. The matrices do not need to pairwise commute. We first provide some equivalent conditions for such a matrix collection to be simultaneously diagonalizable via congruence. Interestingly, one of these conditions requires a positive definite solution to an appropriate system of linear equations over Hermitian matrices. Based on this theoretical result, we propose a polynomial-time algorithm for numerically solving the Hermitian SDC problem. The proposed algorithm is a combination of (1) a detection of whether the initial matrix collection is simultaneously diagonalizable via congruence by solving an appropriate semidefinite program and (2) an existing Jacobi-like

algorithm for simultaneously diagonalizing (via congruence) the new collection of commuting Hermitian matrices derived from the previous stage. Illustrating examples and numerical tests with MATLAB are also presented. Consequently, the solvable condition for the SDC problem of arbitrarily square matrices will be obtained by dealing with their Hermitian and skew-Hermitian parts.

Tran Thi Khieu and Hoang-Hung Vo; *Stability Results for Backward Nonlinear Diffusion Equations with Temporal Coupling Operator of Local and Nonlocal Type*; Siam j. Numer. Anal. Vol. 60, no. 4, pp. 1665-1700.

Abstract. In this paper, we investigate the problem of reconstructing the historical distribution for a nonlinear diffusion equation, in which the diffusion is driven by not only a nonlocal operator but also a locally one. The problem naturally arises in many real-world applications including the biological population dynamic where a population competes for the resources and diffuses by a combination of classical and nonlocal dispersal processes. By using the Banach fixed point theorem and some appropriate estimates, we first construct an example to show the ill-posedness of the problem. Next, we propose a filter regularization method written in form of a nonlinear Volterra integral equation, in combination with the new technique recently developed calling the globally Lipschitz approximation. Finally, several numerical tests, with a combination of the finite difference schemes and the fast Fourier transform (FFT) algorithm, are also presented to illustrate the theoretical results.

Van Kien Nguyen, Van Dung Nguyen, *Best n -term approximation*

of diagonal operators and application to function spaces with mixed smoothness, Analysis Mathematica 48 (2022), 1127-1152.

Abstract. In this paper we give exact values of the best n -term approximation widths of diagonal operators between $\ell_p(\mathbb{N})$ and $\ell_q(\mathbb{N})$ with $0 < p, q \leq \infty$. The result will be applied to obtain the asymptotic constants of best n -term approximation widths of embeddings of function spaces with mixed smoothness by trigonometric system.

A. Mohammadi, T. Pham, and A. Warren, *A point-conic incidence bound and applications over F_p* , European Journal of Combinatorics 107 (2023): 103596.

Abstract. In this paper, we prove the first incidence bound for points and conics over prime fields. As applications, we prove new results on expansion of bivariate polynomial images and on certain variations of distinct distances problems. These include new lower bounds on the number of pinned algebraic distances as well as improvements of results of Koh and Sun (2014) and Shparlinski (2006) on the size of the distance set formed by two large subsets of finite dimensional vector spaces over finite fields. We also prove a variant of Beck's theorem for conics.

Le Dung Muu, Xuan Thanh Le, Nguyen Ngoc Hai. *On the proximal mapping for multi-valued monotone variational inequality problems*. Optimization Letters, 2022.

Abstract. We extend the concept of the proximal mapping of a real valued function on a convex set to the one of a multi-valued operator, and study its fixed point properties. We show that the extended prox-

imal mapping possesses certain contraction (resp., nonexpansiveness, approximate nonexpansiveness) properties when the multi-valued operator involved is strongly monotone (resp., cocoercive, monotone). Applications to multi-valued variational inequality and equilibrium problems are discussed.

Minh Anh Nguyen, Hai Long Luong, Minh Hoàng Hà, Ha-Bang Ban. *An efficient branch-and-cut algorithm for the parallel drone scheduling traveling salesman problem.* 4OR - A Quarterly Journal of Operations Research, 2022. (Impact factor: 1.76).

Abstract. This paper proposes an efficient branch-and-cut algorithm to exactly solve the parallel drone scheduling traveling salesman problem. The problem is first formulated as a mixed integer linear program with truck-flow variables defined on undirected edges, not on directed arcs as in existing models. The formulation is then strengthened by valid inequalities and the branchand-cut algorithm is developed. The experimental results show that our algorithm can find optimal solutions for all existing instances, but two in a reasonable running time. To make the problem more challenging for future solution methods, we introduce two new sets of 120 larger instances with the number of customers varying from 318 to 783 and test our algorithm and investigate the performance of state-of-the-art metaheuristics on these instances. We show that the proposed algorithm can steadily solve the instances with up to 400 customers to optimality. Optimal solutions of several cases with 600 and 783 customers are also found by our algorithm. This is the first time problems of such a large size are optimally solved.

Linquan Ma and Pham Hung Quy; *A Buchsbaum theory for tight*

closure; Trans. Amer. Math. Soc. 375 (2022), 8257-8276.

Abstract. A Noetherian local ring (R, \mathfrak{m}) is called Buchsbaum if the difference $e(\mathfrak{q}, R) - \ell(R/\mathfrak{q})$, where \mathfrak{q} is an ideal generated by a system of parameters, is a constant independent of \mathfrak{q} . In this article, we study the tight closure analog of this condition. We prove that in an unmixed excellent local ring (R, \mathfrak{m}) of prime characteristic $p > 0$ and dimension at least one, the difference $e(\mathfrak{q}, R) - \ell(R/\mathfrak{q}^*)$ is independent of \mathfrak{q} if and only if the parameter test ideal $\tau_{\text{par}}(R)$ contains \mathfrak{m} . We also provide a characterization of this condition via derived category which is analogous to Schenzel's criterion for Buchsbaum rings.

Nguyen Cong Minh, Le Dinh Nam, Thieu Dinh Phong, Phan Thi Thuy, Thanh Vu, *Comparison between regularity of small symbolic powers and ordinary powers of an edge ideal*, Journal of Combinatorial Theory, Series A, Volume 190, August 2022, 105621, ViAsM20.21

Abstract. Let $I = I(G)$ be the edge ideal of a simple graph G . We prove that

$$\text{reg}\left(I^{(s)}\right) = \text{reg}\left(I^s\right)$$

for $s = 2, 3$, where $I^{(s)}$ is the s -th symbolic power of I . As a consequence, we prove the following bounds $\text{reg} I^s \leq \text{reg} I + 2s - 2$, for $s = 2, 3$

$$\text{reg} I^{(s)} \leq \text{reg} I + 2s - 2, \text{ for } s = 2, 3, 4$$

J. Minac, F.W. Pasini, C. Quadrelli and N.D. Tan, *Mild pro- p groups and the Koszulity conjectures*, Expositiones Mathematicae. Available online 5 April 2022.

Abstract. Let p be a prime, and \mathbb{F}_p the field with p elements. We prove

that if G is a mild pro- p group with quadratic \mathbb{F}_p -cohomology algebra $H^\bullet(G, \mathbb{F}_p)$, then the algebras $H^\bullet(G, \mathbb{F}_p)$ and $\text{gr } \mathbb{F}_p[G]$ - the latter being induced by the quotients of consecutive terms of the p Zassenhaus filtration of G - are both Koszul, and they are quadratically dual to each other. Consequently, if the maximal pro- p Galois group of a field is mild, then Positselski's and Weigel's Koszulity conjectures hold true for such a field.

Jan Minac, Tung T. Nguyen and Nguyen Duy Tan, *Fekete polynomials, quadratic residues, and arithmetic*, Journal of Number Theory Available online 27 June 2022.

Abstract. Fekete polynomials associate with each prime number p a polynomial with coefficients -1 or 1 except the constant term, which is 0 . These coefficients reflect the distribution of quadratic residues modulo p . These polynomials were already considered in the 19th century in relation to the studies of Dirichlet L -functions. In our paper, we introduce two closely related polynomials. We then express their special values at several integers in terms of certain class numbers and generalized Bernoulli numbers. Additionally, we study the splitting fields and the Galois group of these polynomials. In particular, we propose two conjectures on the structure of these Galois groups. We also provide some computational evidence toward the validity of these conjectures.

Phan Thanh Nam, Tran Ngoc Nguyen and Hieu Trinh; *Exponential Estimate of Positive Time-Delay Systems with Polytopic Uncertainties*; Siam j. Control optim vol. 60, no. 5, pp. 3026-3050.

Abstract. This paper presents a new method for solving the problem of computing an α -exponential estimate for a class of perturbed

positive time-delay systems with polytopic uncertainties in the system matrices. Rather than using the "maximum matrix" technique as in almost all of the existing methods, our developed method is based on (i) extensions of the copositive Lyapunov function method, the comparison principle, and the ultimate bound estimate method, with the parameter-dependent vector technique; and (ii) the constructions of respective numerical algorithms for computing optimal factors. Using the parameter-dependent vector technique, which helps to exploit more effectively all the information of vertex-matrices, we obtain a less conservative sufficient condition for the existence of an α -exponential estimate. Furthermore, together with the constructions of respective numerical algorithms, our method can compute and provide "more accurate" α -exponential estimates. Lastly, through two numerical examples, we verify the effectiveness of the developed method.

V.H. Nhu, N.Q. Tuan, N.b. Giang, N.T.T. Huong, *Continuity regularity of optimal control solutions to distributed and boundary semilinear elliptic optimal control problems with mixed pointwise control-state constraints*, Journal of Mathematical Analysis and Applications Volume 512, Issue 1,1 August 2022, 126139.

Abstract. This paper is concerned with the existence and regularity of minimizers to an optimal control problem governed by semilinear elliptic equations, in which mixed pointwise control-state constraints are considered in a quite general form and the controls act simultaneously in the domain and on the boundary. The L^2 - and L^p -type regularization is considered for both distributed and boundary controls. Under standing assumptions, the minimizers and the corresponding multipliers do exist. Furthermore, by applying the bootstrapping technique

and using some calculation tools for functions in Sobolev spaces of fractional order, the optimal solutions are shown to be Lipschitz continuous when the L^2 -type regularization is applied and they are proven to be Hölder continuous with the exponent $\theta = \frac{1}{p-1}$ if only L^p -type regularization is used.

Huynh Van Ngai, Nguyen Huu Tron, Nguyen Van Vu & Michel Théra, *Variational analysis of Paraconvex Multifunctions*, Journal of Optimization Theory and Applications (2022).

Abstract. Our aim in this article is to study the class of so-called ρ -paraconvex multifunctions from a Banach space X into the subsets of another Banach space Y . These multifunctions are defined in relation with a modulus function $\rho : X \rightarrow [0, +\infty)$ satisfying some suitable conditions. This class of multifunctions generalizes the class of γ -paraconvex multifunctions with $\gamma > 1$ introduced and studied by Rolewicz, in the eighties and subsequently studied by A. Jourani and some others authors. We establish some regular properties of graphical tangent and normal cones to paraconvex multifunctions between Banach spaces as well as a sum rule for coderivatives for such class of multifunctions. The use of subdifferential properties of the lower semi-continuous envelope function of the distance function associated to a multifunction established in the present paper plays a key role in this study.

Nam-Ky Nguyen, Stella Stylianou, Mai Phuong Vuong & Tung-Dinh Pham (2022), *Designs for screening experiments with quantitative factors*, *Chemometrics - Recent Advances, New Perspectives and Applications*, IntechOpen, Edited by Vu Dang Hoang.

Abstract. Most screening experiments in chemometrics and science are quantitative, i.e. continuous factors. These factors should be 3-level and the designs for these experiments should also be 3-level. However, popular designs for screening experiments are still Plackett-Burman designs (PBDs) and 2-level fractional factorial designs (FFDs) such as resolution III and resolution IV FFDs. This chapter introduces the conference matrices as an alternative to PBDs and resolution III FFDs and definitive screening designs, a conference matrix-based class of designs, as an alternative to resolution IV FFDs. A table of conference matrices of up to order 32 and examples are also provided for illustration.

Nam-Ky Nguyen, J.J. Borkowski & Mai Phuong Vuong,(2022) *Cyclic Generators for Box-Behnken Designs and New SecondOrder Designs*, Response Surface Methodology - Research Advances and Applications, IntechOpen, Edited by Palanikumar Kayaroganam.

Abstract. Box-Behnken designs (BBDs) are three-level second-order spherical designs with all points lying on a sphere, introduced by Box and Behnken, for fitting the second-order response surface models. They are available for 3 – 12 and 16 factors. Together with the central composite designs for the second-order model, BBDs are very popular response surface designs, especially for 3 – 7 factors. This chapter introduces an algorithm to produce cyclic generators for BBDs and similar designs, which we call cyclic BBDs (CBBDs). The new CBBDs offer more flexibility in choosing the designs for a specified number of factors. Comparisons between some BBDs and the new CBBDs indicate the superiority of the new CBBDs with respect to multiple design quality measures and graphical tools assessing prediction variance properties. A catalog of 24 new CBBDs, which includes orthogonally

blocked CBBs for 11,13 , and 14 factors, will be given.

Ngoc Khue Tran and Hoang-Long Ngo, *LAMN property for multivariate inhomogeneous diffusions with discrete observations*, Electronic Journal of Statistics .16(2): 4275-4331 (2022), 10.1214/22-EJS2049, Doi: 10.1214/22-EJS2049

Abstract. We consider a class of multidimensional inhomogeneous diffusions whose drift coefficient depends on a multidimensional unknown parameter. Under some appropriate assumptions, we prove the local asymptotic mixed normality property for the drift parameter from high-frequency observations when the length of the observation window tends to infinity. To obtain the result, we use the Malliavin calculus techniques and the change of measures. Our approach is applicable for both ergodic and non-ergodic diffusions.

T. Pham, S. Senger, and T.D. Tran, *Distribution of pinned distance trees in the plane F_p^2* , accepted in Discrete Mathematics, 2023.

Abstract. The recent result of Guth, Iosevich, Ou, and Wang (2019) on the Falconer distance problem states that for a compact set $A \subset \mathbb{R}^2$, if the Hausdorff dimension of A is greater than $\frac{5}{4}$, then the distance set $\Delta(A)$ has positive Lebesgue measure. With a completely different approach, Murphy, Petridis, Pham, Rudnev, and Stevens (2022) proved the prime field version of this result, namely, for $E \subset \mathbb{F}_p^2$ with $|E| \gg p^{5/4}$, there exist many points $x \in E$ such that the number of distinct distances from x is at least cp . The main purpose of this paper is to prove extensions in the more general structure of pinned trees. The case of distances on small sets will also be addressed in this paper.

T. Pham and D. Koh, *A point-sphere incidence bound in odd dimensions and applications*, *Comptes Rendus. Mathématique*, 360(G 6), 687-698.

Abstract. In this paper, we prove a new point-sphere incidence bound in vector spaces over finite fields. More precisely, let P be a set of points and S be a set of spheres in \mathbb{F}_q^d . Suppose that $|P|, |S| \leq N$, we prove that the number of incidences between P and S satisfies

$$I(P, S) \leq N^2 q^{-1} + q^{\frac{d-1}{2}} N,$$

under some conditions on d, q , and radii. This improves the known upper bound $N^2 q^{-1} + q^{\frac{d}{2}} N$ in the literature. As an application, we show that $A \subset \mathbb{F}_q$ with $q^{1/2} \ll |A| \ll q^{\frac{d^2+1}{d^2}}$, one has

$$\max \{ |A + A|, |dA^2| \} \gg \frac{|A|^d}{q^{\frac{d-1}{2}}}.$$

This improves earlier results on this sum-product type problem over arbitrary finite fields.

T. Pham and F. Clement, *Distribution of distances in five dimensions and related problems*, *SIAM Journal on Discrete Mathematics*, 36(3), 2271-2281.

Abstract. In this paper, we study the Erdős–Falconer distance problem in five dimensions for sets of Cartesian product structures. More precisely, we show that for $A \subset \mathbb{F}_p$ with $|A| \gg p^{\frac{13}{22}}$, then $\Delta(A^5) = \mathbb{F}_p$. When $|A - A| \sim |A|$, we are able to obtain stronger conclusions as follows: 1. If $p^{13/22} \ll |A| \ll p^{\frac{2}{3}}$, then $(A - A)^2 + A^2 + A^2 + A^2 + A^2 = \mathbb{F}_p$. 2. If $p^{4/7} \ll |A| \ll p^{\frac{2}{3}}$, then $(A - A)^2 + (A - A)^2 + A^2 + A^2 + A^2 + A^2 = \mathbb{F}_p$. We also prove that if

$p^{4/7} \ll |A - A| = K|A| \leq p^{5/8}$, then $|A^2 + A^2| \gg \min \left\{ \frac{p}{K^4}, \frac{|A|^{8/3}}{K^{7/3}p^{2/3}} \right\}$.
 As a consequence, $|A^2 + A^2| \gg p$ when $|A| \sim p^{5/8}$ and $K \sim 1$, where $A^2 = \{x^2 : x \in A\}$

T.D. Phung, D.T. Duc, and V.K.Tuan, *Multi-term fractional oscillation integro-differential equations*, *Fract. Calc. Appl. Anal.* 25(4), 1713-1733 (2022).

Abstract. In this paper we study solvability of multi-term Caputo and Riemann-Liouville fractional oscillation integro-differential equations. We show that these equations have unique solutions in the space of functions with square average power growth and derive the solutions in explicit forms.

Phuong T.Nguyen, Claudio Di Sipio, Juri Di Rocco, Davide Di Ruscio, Massimiliano Di Penta, *Fitting missing API puzzles with machine translation techniques*, *Expert Systems with Applications* Volume 216, 15 April 2023, 119477

Abstract. While implementing software projects, developers do not reinvent the wheel but try to reuse existing API calls and source code. In recent years, the problems related to recommending APIs and code snippets have been intensively investigated. Although current approaches have achieved encouraging performance, there is still the need to improve the recommendation process's effectiveness and efficiency. In this work, we reformulate the problem of API recommendations by proposing learning and recommending API sequences relevant to a given coding context. We present LUPE, a novel approach to API and code recommendation, exploiting cutting-edge deep learning techniques. Thanks to the underlying Encoder-Decoder architecture

specialized in transforming sequences, LUPE can effectively learn the order in which invocations occur. The approach has been evaluated on two Android datasets and compared with GAPI and FACER, two state-of-the-art API recommender systems. Being fed with augmented training data, our conceived approach can obtain a high prediction accuracy, and produce a perfect match in several cases, hence outperforming the baselines.

Quang Anh Pham, Minh Hoàng Hà, Duy Manh Vu, Huy Hoang Nguyen. *A Hybrid Genetic Algorithm for the Vehicle Routing Problem with Roaming Delivery Locations.* Proceedings of the Thirty-Second International Conference on Automated Planning and Scheduling (ICAPS2022), pages 297-306, 2022. (Hội nghị ranked A*).

Abstract. The Vehicle Routing Problem with Roaming Delivery Locations (VRPRDL) is a variant of the Vehicle Routing Problem (VRP) in which a customer can be present at many locations during a working day and a time window is associated with each location. The objective is to find a set of routes such that (i) the total traveling cost is minimized, (ii) only one location of each customer is visited within its time window, and (iii) all capacity constraints are satisfied. To solve the problem, we introduce a hybrid genetic algorithm which relies on problem-tailored solution representation, mutation, local search operators, as well as a set covering component exploring routes found during the search to find better solutions. We also propose a new split procedure which based on dynamic programming to evaluate the fitness of chromosomes. Experiments conducted on the benchmark instances clearly show that our proposed algorithm outperforms existing approaches in terms of stability and solution quality. We also improve

49 best known solutions of the literature.

JIAN-WEN SUN AND HOANG-HUNG VO, Local approximation of heterogeneous porous medium equation by some nonlocal dispersal problems.

Abstract. The classical porous medium equation is widely used to model different natural phenomena related to diffusion, filtration and heat propagation. In this short communication, we prove that the solution of porous medium equation can be locally approximated by the solution of a class of nonlocal dispersal equation. Our work is a counterpart to the important works [4, 5, 18, 19, 25, 27, 32, 34].

Nguyen Khoa Son, Le Trung Hieu, Cao Thanh Tinh, & Do Duc Thuan (2022), *New criteria for exponential stability of a class of nonlinear continuous-time difference systems with delays*, International Journal of Control, 1-24,

Abstract. In this paper, we present some new explicit criteria for exponential stability of positive monotone homogeneous continuous-time difference systems. Then, we apply the comparison principle to prove some novel criteria for exponential stability of general nonlinear continuous-time difference systems with delays, not necessarily monotone and homogeneous. The obtained criteria include many results existing in the literature as particular cases. Some examples are given to illustrate the obtained results.

Do Duc Thuan & Nguyen Hong Son, *Solvability and stability of stochastic singular difference equations with constant coefficient matrices of index- v* .

Abstract. In this paper, we shall deal with stochastic singular difference equations (SSDEs) with constant coefficient matrices and nonlinear stochastic perturbations. The solvability and stability of SSDEs are difficult to study because of the singularity of the leading coefficient matrix. An index- v concept is derived and formulas of solution are established for these equations. The continuous dependence of solution on initial condition is also considered. Finally, the stability of SSDEs is studied by using the method of Lyapunov functions. Some examples are given to illustrate the results.

Duong Viet Thong, Pham Ky Anh, Vu Tien Dung, Do Thi My Linh, *A novel method for finding minimum-norm solutions to pseudomonotone variational inequalities.*

Abstract. In this paper, we introduce a novel iterative method for finding the minimum-norm solution to a pseudomonotone variational inequality problem in Hilbert spaces. We establish strong convergence of the proposed method and its linear convergence under some suitable assumptions. Some numerical experiments are given to illustrate the performance of our method. Our result improves and extends some existing results in the literature.

Nguyen Minh Tung, *Strict efficiency conditions for nonsmooth optimization with inclusion constraint under Hölder directional metric subregularity,* Optimization A Journal of Mathematical Programming and Operations Research.

Abstract. In this paper, we investigate the higher-order optimality conditions for strict efficient solutions to a nonsmooth optimization problem subject to inclusion constraint. A concept of higher-order con-

contingent derivative type for set-valued maps, some main calculus rules of which are obtained, is proposed and employed with the Robinson-Ursescu open mapping theorem to get a Karush-Kuhn-Tucker condition under assumptions of Hölder direction metric subregularity. Sufficient conditions for these solutions are established without convexity assumptions and possibly without the existence of derivatives. As an application, we extend some optimality conditions for a nonsmooth optimization problem subject to generalized inequality constraint. Another application is presented for necessary and sufficient conditions for robust local strict efficient solutions in uncertain vector optimization. Some examples are provided to illustrate our theorems as well. Our results are new and improve the existing ones in the literature substantially.

Nguyen Minh Tung, *Second-order efficient optimality conditions for set-valued vector optimization in terms of asymptotic contingent epiderivatives*, rairo-oper. res. 55 (2021) 841-860.

Abstract. We propose a generalized second-order asymptotic contingent epiderivative of a set-valued mapping, study its properties, as well as relations to some second-order contingent epiderivatives, and sufficient conditions for its existence. Then, using these epiderivatives, we investigate set-valued optimization problems with generalized inequality constraints. Both second-order necessary conditions and sufficient conditions for optimality of the Karush-Kuhn-Tucker type are established under the second-order constraint qualification. An application to Mond-Weir and Wolfe duality schemes is also presented. Some remarks and examples are provided to illustrate our results.

Nguyen Minh Tung, and Mai Van Duy, *Painlevé-Kuratowski convergences of the solution sets for vector optimization problems with free disposal sets*, Journal of industrial and management optimization.

Abstract. This paper aims to present results on the Painlevé-Kuratowski set-convergence of the sets of both infimal and minimal points of a sequence of perturbed vector optimization problems through free disposal sets. By assumptions of sequential compactness of the feasible sets or the uniform coerciveness of objective functions, this convergence is obtained both in the image and given spaces under the perturbations of objective functions and feasible sets. Besides, we also establish set-convergences of sequences of approximation solution sets. Applications to the stability of conic, quadratic and linear vector optimization problems are given. Some examples are provided to illustrate our results.

Trong-Hoang Do, My-Hanh Pham, *The size of Betti tables of edge ideal of clique corona graphs*, Archiv der Mathematik, 118 (2022), 577-586.

Abstract. Let $\mathcal{H} = \{H_v : v \in V(G)\}$ be a family of nonempty graphs indexed by the vertex set of a graph G . The corona $G \circ \mathcal{H}$ of G and \mathcal{H} is the disjoint union of G and $H_v, v \in V(G)$, with additional edges joining each vertex $v \in V(G)$ to all the vertices of H_v . In this paper, we show that the corona graph $G \circ \mathcal{H}$ is Cohen-Macaulay if and only if $G \circ \mathcal{H}$ is a clique corona graph, i.e., all graphs H_v in \mathcal{H} are complete graphs. In addition, if I denotes the edge ideal of the clique corona graph $G \circ \mathcal{H}$, we prove that the Castelnuovo-Mumford regularity of R/I is equal to the induced matching number of $G \circ \mathcal{H}$.

Nguyen Xuan Tho, **Counterexamples to the Hasse principle**

in families, Bull. Aust. Math. Soc.

Abstract. We generalise two quartic surfaces studied by Swinnerton-Dyer to give two infinite families of diagonal quartic surfaces which violate the Hasse principle. Standard calculations of Brauer-Manin obstructions are exhibited.

Nguyen Xuan Tho, *On a problem of Richard Guy*, Bull. Aust. Math. Soc.

Abstract. In the 1993 Western Number Theory Conference, Richard Guy proposed Problem 93:31, which asks for integers n representable by $(x+y+z)^3/xyz$, where x, y, z are integers, preferably with positive integer solutions. We show that the representation $n = (x+y+z)^3/xyz$ is impossible in positive integers x, y, z if $n = 4^k(a^2 + b^2)$, where $k, a, b \in \mathbb{Z}^+$ are such that $k \geq 3$ and $2 \nmid a + b$.

Nguyen Xuan Tho, *Solutions to a Lebesgue-Nagell equation*, Bull. Aust. Math. Soc.

Abstract. We find all integer solutions to the equation $x^2 + 5^a \cdot 13^b \cdot 17^c = y^n$ with $a, b, c \geq 0$, $n \geq 3$, $x, y > 0$ and $\gcd(x, y) = 1$. Our proof uses a deep result about primitive divisors of Lucas sequences in combination with elementary number theory and computer search.

Nguyen Xuan Tho, *The equation $x_1/x_2 + x_2/x_3 + x_3/x_4 + x_4/x_1 = n$* , International Journal of Number Theory.

Abstract. It is a subtle question as to when the Diophantine equation of the title has solutions in positive integers. Here, we show that the equation in the title does not have solutions in positive integers in

the case that n is of the form $n = 4q$, where $q^2 - 1 = 2^h q_1$, with $h, q_1 \in \mathbb{Z}^+, 2 \mid h, h \geq 4$, and $8 \mid q_1 + 1$. We do this by explicitly calculating a Brauer-Manin obstruction to weak approximation on the elliptic surface defined by the title equation.

Nguyen Xuan Tho, *Solutions to $x^4 + py^4 = z^4$ in cubic number fields*, Archiv der Mathematik (2022).

Abstract. We investigate the equation $x^4 + Dy^4 = z^4$ in cubic number fields. Then we show that if p is a prime congruent to 11 mod 16, the equation $x^4 + py^4 = z^4$ only has solutions $x = \pm z, y = 0$ in any cyclic cubic number field.

Nguyen Xuan Tho, *Fermat quartics with only trivial solutions in any odd degree number field*, Periodica Mathematica Hungarica.

Abstract. Let D be a positive integer. The equation $x^4 + y^4 = Dz^4$ defines a Fermat quartic. Bremner (Proc Lond Math Soc 52(1):193-214, 1986, Example 12, 13) proved that the Fermat quartics $x^4 + y^4 = 5617z^4$ and $x^4 + y^4 = 4481z^4$ had only the trivial solution $x = y = z = 0$ in any odd degree number field. He realised 32 years later that his proofs are incorrect, see Bremner (Proc Lond Math Soc (3) 116:1028, 2018). Hence examples of Fermat quartics satisfying his two conditions: (i) having only the trivial solution $x = y = z = 0$ in any odd degree number field, (ii) the curve $X^2 + y^4 = Dz^4$ has rank at least 2 and the curve $x^4 + y^4 = DZ^2$ has positive rank have still been unknown. In this paper, we provide such examples by proving that, for odd primes p , the equation

$$x^4 + y^4 = 4pz^4$$

has only the solution $x = y = z = 0$ in any odd degree number field.

The case $p = 113$ gives an example satisfying Bremner's conditions.

Nguyen Xuan Tho, *On the Diophantine equation $x^4 + y^4 = c$* , Acta Arithmetica.

Abstract. We study the equation

$$x^4 + y^4 = c, \quad (*)$$

where $c \leq 10^4$ is a positive integer. First, we show that when $c = 7537$ or $c = 8882$ then $(*)$ has no rational solutions, hence completing Henri Cohen's table on the solvability of $(*)$ in the rational numbers. Second, for all $c \leq 10^4$, where $(*)$ is everywhere locally solvable but globally unsolvable, we show that for any positive integer $d \geq 2$, equation $(*)$ has solutions in some number field of degree d .

Nguyen Xuan Tho, *On a remark of Sierpinski*, Rocky Mountain Journal of Mathematics, Volume 52 (2022), No. 2, 717-726.

Abstract. In a remark on page 80 of his classical book 250 Problems in Elementary Number Theory, Sierpiński stated that it was not known if the equation $x/y + y/z + z/x = 4$ has solutions in positive integers. Bondarenko (Investigation of a class of Diophantine equations, Ukrain. Mat. Zh. 52:6 (2000), 831-836) gave a negative answer to Sierpiński's remark by showing that the equation $x/y + y/z + z/x = 4k^2$ does not have solutions in positive integers if $3 \nmid k$. However, Garaev (Diophantine equations of the third degree, Tr. Mat. Inst. Steklova 218 (1997), 99-108) had already proved that the equation $x^3 + y^3 + z^3 = nxyz$ has no positive integer solutions if $n = 4k, n = 8k - 1$, or $n = 2^{2m+1}(2k - 1) + 3$, where $m, k \in \mathbb{Z}^+$, which Bondarenko's result is a consequence of. In this paper, we shall partially extend Garaev's

result by showing that the equation $x/y + y/z + m \cdot (z/x) = nm$ does not have solutions in positive integers if m is odd and $4 \mid n$ or $8 \mid n + 1$. Our method is different from Garaev's method and has been successfully applied to several situations.

Nguyen Xuan Tho, *The equation $x^4 + 2^n y^4 = z^4$ in algebraic number fields*, Acta Mathematica Hungarica volume 167, pages 309-331 (2022).

Abstract. Let n be a positive integer. We show that if the equation

$$x^4 + 2^n y^4 = z^4 \tag{1}$$

has a solution (x, y, z) in a cubic number field K with $xyz \neq 0$, then the Galois group of the field K is the symmetric group S_3 . In addition, we show that for every positive integer $d > 1$, there exists a number field K_d of degree d such that equation (1) has a solution (x, y, z) in K_d with $xyz \neq 0$. This paper extends the recent work of Bremner and Choudhry [5].

Tung N.M.; Bao, N. X. D, *Higher-order set-valued Hadamard directional derivatives: calculus rules and sensitivity analysis of equilibrium problems and generalized equations*, Journal of Global Optimization. 83 (2022): 377-402.

Abstract. In this paper, we propose a notion of higher-order directional derivatives in the sense of Hadamard for set-valued maps, which is a natural extension of the classical directional derivatives. Some of the usual calculus rules, for unions, intersections, products, sums, and compositions are given under directional metric subregularity conditions. The Hadamard differentiability of the efficient value mapping and a formula to compute its derivative are also obtained. Then, we apply

these derivatives to establish an implicit set-valued map theorem and employ it to higher-order sensitivity analysis of the solution mapping for a parametric vector equilibrium problem. Sensitivity for solutions to a parametric generalized equation is also investigated. Many examples are provided for analyzing and illustrating the obtained results.

Trung-Thuy Kieu, Duc-Trong Luong, Hoang-Long Ngo and Ngoc Khue Tran, *Strong convergence in infinite time interval of tamed-adaptive Euler-Maruyama scheme for Lévy-driven SDEs with irregular coefficients*, Computational and Applied Mathematics, 41, 301, 1-31 (2022).

Abstract. A tamed-adaptive Euler-Maruyama approximation scheme is proposed for Lévy-driven stochastic differential equations with locally Lipschitz continuous, polynomial growth drift, and locally Hölder continuous, polynomial growth diffusion coefficients. The new scheme converges in both finite and infinite time intervals under some suitable conditions on the regularity and the growth of the coefficients.

Nguyen Duy Tan, Nguyen Xuan Tho, *Notes on Melvyn Knight's problem*, Proceedings of the Romanian Academy Series A Mathematics Physics Technical Sciences Information Science. (2022), Online. (File B1)

Abstract. Abstract. Melvyn Knight's problem asks for positive integers n that can be represented as $n = (x + y + z) \left(\frac{1}{x} + \frac{1}{y} + \frac{1}{z} \right)$ with integers x, y, z . In this paper, we investigate integers n that can be represented as

$$n = \frac{x + y + z}{a^2 b^2 c^2} \left(\frac{a^2}{x} + \frac{b^2}{y} + \frac{c^2}{z} \right)$$

with integers x, y, z, a, b, c . For integers n, a, b, c satisfying $4 \mid n$ or $8 \mid n - 5, a + b + c = -1$, and abc is a square number, we show that the representation (1) is essentially unique if $na^2b^2c^2 = (|a| + |b| + |c|)^2$ and is impossible if $na^2b^2c^2 \neq (|a| + |b| + |c|)^2$.

Nguyen Xuan Tho, *On sum of positive rationals with given products*, Mediterranean Journal of Mathematics, 2022, Volume 19, Article 179.

Abstract. In this paper, we study the problem on the sum of four rational numbers with a fixed product. We will show that when d in an odd positive integer, the equation

$$\frac{x}{y} + d\frac{y}{z} + \frac{z}{w} + d\frac{w}{x} = 4dn$$

does not have solutions in positive integers if $2 \mid n$ or $dn^2 = 1 + 2^{2m}q$, where $m, q \in \mathbb{Z}^+, m \geq 2$, and $8 \mid q + 1$. This extends the recent results of the author and Dofs and Tho (Int J Number Theory, 18 (1): 75-87, 2022 and Tho (Vietnam J Math 50 (1):183-194, 2022).

Duong Viet Thong, Pham Ky Anh, Vu Tien Dung, Do Thi My Linh, *A novel method for finding minimum-norm solutions to pseudomonotone variational inequalities*, Netw. Spat. Econ., 2022.

Abstract. In this paper, we introduce a novel iterative method for finding the minimum-norm solution to a pseudomonotone variational inequality problem in Hilbert spaces. We establish strong convergence of the proposed method and its linear convergence under some suitable assumptions. Some numerical experiments are given to illustrate the performance of our method. Our result improves and extends some existing results in the literature.

Trung Thanh Nguyen, Jörg Rothe. *Fair and efficient allocation*

with few agent types, few item types, or small value levels. Artificial Intelligence, vol 314, 2023. (Impact factor: 14.05).

Abstract. In fair division of indivisible goods, allocations that satisfy fairness and efficiency simultaneously are highly desired but may not exist or, even if they do exist, are computationally hard to find. Conditions under which such allocations, or allocations satisfying specific levels of fairness and efficiency simultaneously, can be efficiently found have thus been explored. Following this line of research, this study is concerned with the problem in a high-multiplicity setting where instances come with certain parameters, including agent types, item types, and value levels. Particularly, we address two computational problems. First, we wish to compute fair and Pareto-optimal allocations, w.r.t. any of the common fairness criteria: proportionality, maximin share, and max-min fairness. Second, we seek to find a max-min fair allocation that is efficient in the sense of maximizing utilitarian social welfare. We show that the first problem is tractable for most of the fairness criteria when the number of item types is fixed, or when at least two of the three parameters are fixed. For the second problem, we model it as a bi-criteria optimization problem that is solved approximately by determining an approximate Pareto set of bounded size. Our results are obtained based on dynamic programming and linear programming approaches. Our techniques strengthen known methods and can be potentially applied to other notions of fairness and efficiency.

Nguyen Nhu Thang, *Notes on ultraslow nonlocal telegraph evolution equations.* Proc. Amer. Math. Soc. 151 (2023), 583-593.

Abstract. This paper provides a refinement of the study of asymp-

otic behaviour for a class of nonlocal in time telegraph equations with positively singular kernels. Based on fundamental properties of relaxation functions and recent representation of the fundamental solution in [Nonlinear Anal. 193 (2020), 111411], we establish the asymptotic expansions of the variance of the stochastic process for both long-time and short-time, which sharply improves the main result in [Proc. Amer. Math. Soc. 149 (2021), 2067-2080] by removing their technical conditions on the regularly varying behaviours and reformulating the asymptotic expansion in a more natural form. By analysing a new non-commutative operation on a subclass of completely positive functions, we provide a new way to construct finitely many ultraslow subdiffusion processes that are rapidly slower than a given ultraslow kernel. Consequently, we show that for a given ...

Nguyen Nhu Thang, Tran Dinh Ke, and Nguyen Van Duc, *Stability analysis for nonlocal evolution equations involving infinite delays*, J. Fixed Point Theory Appl. 25 (2023), 1-33, Article No. 22.

Abstract. We deal with the inquiry about stability for nonlocal differential equations involving infinite delays. The dissipativity, stability and weak stability of solutions are addressed by using local estimates, fixed point arguments and a new Halanay-type inequality. Our analysis is based on suitable assumptions on the phase space and nonlinearity function. Our abstract results are illustrated by applying to nonlocal partial differential equations.

Thieu Huy Nguyen, Thi Kim Oanh Tran, *Periodic Motions of the Non-autonomous Oseen-Navier-Stokes Flows Past a Moving Obstacle with Data in L^p -Spaces.*

Abstract. In this paper, we study the time-periodic mild solutions to the non-autonomous Oseen-Navier-Stokes equations (ONSE). We prove the existence and polynomial stability of such solutions to ONSE in the exterior domain $\Omega \subset \mathbb{R}^3$ of a rigid body, $D = \mathbb{R}^3 \setminus \Omega$, moving by time periodic motion of given period T , when the data belong to L^p -space and are sufficiently small. Our method is based on the $L^p - L^q$ smoothness of the evolution family corresponding to linearized equations in combination with ergodic theory and fixed-point theorems to obtain the result on existence and stability of T -periodic solutions under the actions of T -periodic external forces.

Thieu Huy Nguyen & Xuan-Quang Bui, On the existence and regularity of admissibly inertial manifolds with sectorial operators.

Abstract. Motivated by a predator-prey model with cross-diffusion, we consider the evolution equation of the form $(dx/dt) + Ax = f(t, x)$ where the linear operator $-A$ is a sectorial operator having a gap in its spectrum. We prove the existence of an admissibly inertial manifold for such an evolution equation in the case of the spectrum of $-A$ contains an isolated subset which is sufficiently far from the rest, and the nonlinear term f satisfies φ -Lipschitz condition for φ belonging to some admissible space. Next, we will study the regularity of such admissibly inertial manifolds. We then apply the obtained result to the above-mentioned predator-prey model.

Nguyen Thieu Huy, Pham Truong Xuan, Vu Thi Ngoc Ha and Vu Thi Thuy Ha, *Inertial manifolds for parabolic differential equations: the fully nonautonomous case.*

Abstract. We study the existence of an inertial manifold for the so-

lutions to fully non-autonomous parabolic differential equation of the form $\frac{du}{dt} + A(t)u(t) = f(t, u), t > s$. We prove the existence of such an inertial manifold in the case that the family of linear partial differential operators $(A(t))_{t \in \mathbb{R}}$ generates an evolution family $(U(t, s))_{t \geq s}$ satisfying certain dichotomy estimates, and the nonlinear forcing term $f(t, x)$ satisfies the Lipschitz condition such that certain dichotomy gap condition holds.

Thieu Huy Nguyen, Truong Xuan Pham, Thi Van Nguyen and Thi Ngoc Ha Vu, *On Periodic Solutions of the Incompressible Navier Stokes Equations on Non-compact Riemannian Manifolds*.

Abstract. In this paper, we study the existence, uniqueness and stability of the time periodic mild solutions to the incompressible Navier-Stokes equations on the non-compact manifolds with negative Ricci curvature tensor. In our strategy, we combine the dispersive and smoothing estimates for Stokes semigroups and Massera-type theorem to establish the existence and uniqueness of the time periodic mild solution to Stokes equation on Riemannian manifolds. Then using fixed point arguments, we can pass to semilinear equations to obtain the existence and uniqueness of the periodic solution to the incompressible Navier-Stokes equations under the action of a periodic external force. The stability of the solution is also proved by using the cone inequality. **Fávaro, V. V.; Hai, P. V.; Pellegrino, D. M.; Severiano, O. R;** *Composition operators on Hardy-Smirnov spaces*; J. Math. Anal. Appl. 515, No. 2, Article ID 126391, 23 p. (2022).

Abstract. We investigate composition operators C_{Φ} on the Hardy-Smirnov space $H^2(\Omega)$ induced by analytic self-maps Φ of an open

simply connected proper subset Ω of the complex plane. When the Riemann map $\tau : \mathbb{U} \rightarrow \Omega$ used to define the norm of $H^2(\Omega)$ is a linear fractional transformation, we characterize the composition operators whose adjoints are composition operators. As applications of this fact, we provide a new proof for the adjoint formula discovered by Gallardo-Gutiérrez and Montes-Rodríguez and we give a new approach to describe all Hermitian and unitary composition operators on $H^2(\Omega)$. Additionally, if the coefficients of τ are real, we exhibit concrete examples of conjugations and describe the Hermitian and unitary composition operators which are complex symmetric with respect to specific conjugations on $H^2(\Omega)$. We finish this paper showing that if Ω is unbounded and Φ is a non-automorphic self-map of Ω with a fixed point, then C_Φ is never complex symmetric on $H^2(\Omega)$.

PREPRINTS:

Alex Iosevich, Minh-Quy Pham, Thang Pham, Chun-Yen Shen,

Pinned simplices and connections to product of sets on paraboloids

Abstract. In this paper we obtain improved dimensional thresholds for dot product sets corresponding to compact subsets of a paraboloid. As a direct application of these estimates, we obtain significant improvements to the best known dimensional thresholds that guarantee that a given compact subset of Euclidean space determines a positive proportion of all possible congruence classes of simplexes. In many regimes this improves the results previously obtained by Erdogan-Hart-Iosevich ([7]), Greenleaf-Iosevich-Liu-Palsson ([13]) and others.

Ali Mohammadi, Quy Pham, Thang Pham, Chun-Yen Shen,

Discretized sum-product type problems: Energy variants and Applications

Abstract. In this paper we establish non-trivial estimates for the additive discretized energy of

$$\sum_{c \in C} |\{(a_1, a_2, b_1, b_2) \in A^2 \times B^2 : |(a_1 + cb_1) - (a_2 + cb_2)| \leq \delta\}|_\delta,$$

that depend on the non-concentration conditions of the sets. Our proofs introduce a number of novel approaches which make use of a combination of methods from both continuous and discrete settings including a pivoting argument, which has been used in the finite field setting due to Murphy and Petridis, the recent Guth-Katz-Zahl's method for the discretized sumproduct problem and a Dabrowski-Orponen-Villa

point-tube incidence bound. As applications, we obtain a number of improvements on the size of the δ -covering of sets $A+cB$ and $C(A+A)$. Furthermore, for compact sets $A, B \subset \mathbb{R}$, we also prove new explicit upper bounds on the quantity $\dim_H \{c \in \mathbb{R} : \dim_H(A + cB) \leq \alpha + \epsilon\}$. Our approach leads to considerably shorter proofs over the previous works due to Bourgain and Orponen.

Doan Trung Cuong, Pham Hong Nam, Le Thanh Nhan, *On almost p -standard system of parameters of idealization and applications.*

Abstract. Let (R, \mathfrak{m}) be a Noetherian local ring and M a finitely generated R -module. In this paper, we construct almost p -standard systems of parameters (a very strict subclass of d -sequences) of the idealization $R \times M$ of M over R . As applications, we build Cohen-Macaulay Rees algebras for idealizations, Cohen-Macaulay Rees modules for unmixed modules, then give precise formulas computing all the Hilbert coefficients of the idealization with respect to an almost p -standard system of parameters.

Do Viet Cuong, *Local setting for trace formulas.*

Abstract. In this chapter we establish almost all needed local setting for Selberg trace formula and Kuznetsov trace formula for $G := \mathrm{GL}_2(F)$ (where F is a local field) and their comparison.

Che-Jui Chang, Ali Mohammadi, Thang Pham, Chun-Yen Shen, *Product of sets on varieties in finite fields*

Abstract. Let V be a variety in \mathbb{F}_q^d and $E \subset V$. It is known that if any line passing through the origin contains a bounded number of

points from E , then $|\prod(E)| = |\{x \cdot y : x, y \in E\}| \gg q$ whenever $|E| \gg q^{\frac{d}{2}}$. In this paper, we show that the barrier $\frac{d}{2}$ can be broken when V is a paraboloid in some specific dimensions. The main novelty in our approach is to link this question to the distance problem in one lower dimensional vector space, allowing us to use recent developments in this area to obtain improvements.

Sĩ Tiệp Đình, Feng Guo, Hồng Đức Nguyễn, and Tiến Sơn Phạm, *Limits of real bivariate rational functions*

Abstract. Given two nonzero polynomials $f, g \in \mathbb{R}[x, y]$ and a point $(a, b) \in \mathbb{R}^2$, we give some necessary and sufficient conditions for the existence of the limit $\lim_{(x,y) \rightarrow (a,b)} \frac{f(x,y)}{g(x,y)}$. We also show that, if the denominator g has an isolated zero at the given point (a, b) , then the set of possible limits of $\lim_{(x,y) \rightarrow (a,b)} \frac{f(x,y)}{g(x,y)}$ is a closed interval in $\overline{\mathbb{R}}$ and can be explicitly determined. As an application, we propose an effective algorithm to verify the existence of the limit and compute the limit (if it exists). Our approach is geometric and is based on Puiseux expansions.

Le Xuan Dung, *Hilbert coefficients of good i -filt -rations of modules*

Abstract. Let M be a finitely generated module of dimension d over a Noetherian local ring (A, \mathfrak{m}) and I an \mathfrak{m} -primary ideal. Let \mathbb{F} be a pair of good I -filtrations \mathbb{F} and \mathbb{F}' of M . We show that the Hilbert coefficients $e_i(\mathbb{F})$ are bounded below and above in terms of $i, e_0(\mathbb{F}'), \dots, e_i(\mathbb{F}')$, and reduction numbers of \mathbb{F} and \mathbb{F}' , for all $i \geq 1$

Sĩ Tiệp Đình, Feng Guo, Hồng Đức Nguyễn, and Tiến Sơn Phạm, *Computation of the lojasiewicz exponents of real bivariate analytic functions*

Abstract. The main goal of this paper is to present some explicit formulas for computing the Lojasiewicz exponent in the Lojasiewicz inequality comparing the rate of growth of two real bivariate analytic function germs.

Dinh Dũng, Van Kien Nguyen, Christoph Schwab, Jakob Zech,
Analyticity and sparsity in uncertainty quantification for PDEs with Gaussian random field inputs

Abstract. We establish summability results for coefficient sequences of Wiener-Hermite polynomial chaos expansions for countably-parametric solutions of linear elliptic and parabolic divergenceform partial differential equations with Gaussian random field inputs. The novel proof technique developed here is based on analytic continuation of parametric solutions into the complex domain. It differs from previous works that used bootstrap arguments and induction on the differentiation order of solution derivatives with respect to the parameters. The present holomorphybased argument allows a unified, "differentiation-free" sparsity analysis of Wiener-Hermite polynomial chaos expansions in various scales of function spaces. The analysis also implies corresponding results for posterior densities in Bayesian inverse problems subject to Gaussian priors on uncertain inputs from function spaces. Our results furthermore yield dimension-independent convergence rates of various constructive high-dimensional deterministic numerical approximation schemes such as single-level and multi-level versions of anisotropic sparse-grid HermiteSmolyak interpolation and quadrature in both forward and inverse computational uncertainty quantification.

Dinh Dũng, *Collocation approximation by deep neural ReLU networks for parametric and stochastic PDEs with lognormal inputs.*

Abstract. We obtained convergence rates of the collocation approximation by deep ReLU neural networks of the solution u to elliptic PDEs with lognormal inputs, parametrized by \mathbf{y} from the non-compact set \mathbb{R}^∞ . The approximation error is measured in the norm of the Bochner space $L_2(\mathbb{R}^\infty, V, \gamma)$, where γ is the infinite tensor product standard Gaussian probability measure on \mathbb{R}^∞ and V is the energy space. Under a certain assumption on ℓ_q -summability for the lognormal inputs ($0 < q < 2$), we proved that given arbitrary number $\delta > 0$ small enough, for every integer $n > 1$, one can construct a compactly supported deep ReLU neural network $\phi_n := (\phi_j)_{j=1}^m$ of size at most n on \mathbb{R}^m with $m = \mathcal{O}(n^{1-\delta})$, and a sequence of points $(\mathbf{y}^j)_{j=1}^m \subset \mathbb{R}^m$ (which are independent of u) so that the collocation approximation of u by $\Phi_n u := \sum_{j=1}^m u(\mathbf{y}^j) \Phi_j$, which is based on the m solvers $(u(\mathbf{y}^j))_{j=1}^m$ and the deep ReLU network ϕ_n , gives the twofold error bounds: $\|u - \Phi_n u\|_{L_2(\mathbb{R}^\infty, V, \gamma)} = \mathcal{O}(m^{-(1/q-1/2)}) = \mathcal{O}(n^{-(1-\delta)(1/q-1/2)})$, where Φ_j are the extensions of ϕ_j to the whole \mathbb{R}^∞ . We also obtained similar results for the case when the lognormal inputs are parametrized on \mathbb{R}^M with very large dimension M , and the approximation error is measured in the $\sqrt{g_M}$ -weighted uniform norm of the Bochner space $L_\infty^{\sqrt{g}}(\mathbb{R}^M, V)$, where g_M is the density function of the standard Gaussian probability measure on \mathbb{R}^M .

Dinh Dũng, Van Kien Nguyen, Duong Thanh Pham, *Deep ReLU neural network approximation of parametric and stochastic elliptic PDEs with lognormal inputs*

Abstract. We investigate non-adaptive methods of deep ReLU neural network approximation of the solution u to parametric and stochastic elliptic PDEs with lognormal inputs on noncompact set \mathbb{R}^∞ . The approximation error is measured in the norm of the Bochner space $L_2(\mathbb{R}^\infty, V, \gamma)$, where γ is the tensor product standard Gaussian probability on \mathbb{R}^∞ and V is the energy space. The approximation is based on an m -term truncation of the Hermite generalized polynomial chaos expansion (gpc) of u . Under a certain assumption on ℓ_q -summability condition for lognormal inputs ($0 < q < \infty$), we proved that for every integer $n > 1$, one can construct a non-adaptive compactly supported deep ReLU neural network ϕ_n of size not greater than n on \mathbb{R}^m with $m = \mathcal{O}(n/\log n)$, having m outputs so that the summation constituted by replacing polynomials in the m -term truncation of Hermite gpc expansion by these m outputs approximates u with an error bound $\mathcal{O}((n/\log n)^{-1/q})$. This error bound is comparable to the error bound of the best approximation of u by n -term truncations of Hermite gpc expansion which is $\mathcal{O}(n^{-1/q})$. We also obtained some results on similar problems for parametric and stochastic elliptic PDEs with affine inputs, based on the Jacobi and Taylor gpc expansions.

L. X. Dung, *J. Elias and L. T. Hoa, Upper bounds on two Hilbert coefficients*

Abstract. New upper bounds on the first and the second Hilbert coefficients of a Cohen-Macaulay module over a local ring are given. Characterizations are provided for some upper bounds to be attained. The characterizations are given in terms of Hilbert series as well as in terms of the Castelnuovo-Mumford regularity of the associated graded

module.

Hai Q. Dinh, Hieu V. Ha, Nghia T.H. Tran, and Thieu N. Vo,
On the hamming distances of constacyclic codes of length $7p^s$ over fp^m

Abstract. In this paper, we study the algebraic structures of constacyclic codes of length $n = 7p^s$ over a finite field of characteristics p , where $p > 7$ is a prime number and s a positive integer. The Hamming distance of all codes of these types are determined. In addition, self-orthogonal, dual-containing, selfdual and MDS codes among them will also be characterized.

Trinh Viet Duoc; Ngo Quoc Anh, *Radial and non-radial solutions to $\Delta^3 u + u^{-q} = 0$ in \mathbf{R}^3*

Abstract. Inspired by recent studies on the biharmonic equation $\Delta^2 u + u^{-q} = 0$ in \mathbf{R}^3 , where q is a real number, we consider the higher-order analogous equation

$$\Delta^3 u + u^{-q} = 0 \quad \text{in } \mathbf{R}^3.$$

It is known that this equation admits positive classical solutions that are radially symmetric if, and only if, $q > 1/2$. Besides, under the restriction $q > 1/2$, it is also known that there is a branch of radially symmetric solutions to the equation having the growth at infinity as that of $|x|^4$. In the first part of the paper, by a careful phase-plane analysis, we provide a complete description of possible growth at infinity for radially symmetric solutions to the equation. Having such a classification of growth, in the last part of the paper, we construct non-radial solutions to the equation via a fixed-point argument. To obtain these results, we borrow some ideas often used in the case of

biharmonic equations. However, compared with the case of biharmonic equations, there are some differences leading to new difficulties. A typical example is that it is not clear if solutions to the equation enjoy the super polyharmonic property, which is often used to overcome the lack of maximum principles.

Mouez Dimassi, Ali Wehbe, Hawraa Yazbek, and Ibtissam Zaiter, *Stabilization of wave-wave transmission problem with generalized acoustic boundary conditions*

Abstract. We investigate the energy decay of hyperbolic system of wave-wave with generalized acoustic boundary conditions in d -dimensional space, with the equations being coupled through boundary connection. First, by spectrum approach combining with a general criteria of Arendt-Batty, we prove that our model is strongly stable. Then, after proving that this system lacks the exponential stability, we establish different type of polynomial energy decay rates provided that the coefficients of the acoustic boundary conditions satisfy some assumptions. Further, we present some appropriate examples and show that our assumptions have been set correctly. Finally, we prove that the obtained energy decay rate is optimal in particular case.

Mouez Dimassi, Hawraa Yazbek and Takuya Watanabe, *Spectral asymptotics for magnetic schrodinger operator with slowly varying potential*

Abstract. Consider the Schrödinger operator with constant magnetic field and smooth potential $V : H(\epsilon) = H + V(\epsilon x, \epsilon y)$, $H = D_x^2 + (D_y + \mu x)^2$, $(x, y) \in \Omega_d$, with Dirichlet boundary conditions. Here

$\Omega_d = \Pi_{j=1}^d] - a_j, a_j [\times \mathbb{R}_y^d$. The spectral properties of two operators H and $H(\epsilon)$ are investigated. For ϵ small enough, we study the effect of the slowly varying potential $V(\epsilon x, \epsilon y)$. In particular, we derive asymptotic trace formula and we give an asymptotic expansion in powers of ϵ of the spectral shift function corresponding to $(H(\epsilon), H)$.

Trinh Thanh Deo and Vo Thanh Chi, *On some ideal structure of leavitt path algebras with coefficients in integral domains.*

Abstract. In this paper, we present results concerning the structure of the ideals in the Leavitt path algebra of a (countable) directed graph with coefficients in an integral domain, such as, describing the set of generators for an ideal; the necessary and sufficient conditions for an ideal to be prime; the necessary and sufficient conditions for a Leavitt path algebra to be simple. Besides, some other interesting properties of ideal structure in a Leavitt path algebra are also mentioned.

Nguyen T. V. Hang, Woosuk Jung and M. Ebrahim Sarabi, *Role of subgradients in variational analysis of polyhedral functions*

Abstract. Understanding the role that subgradients play in various second-order variational analysis constructions can help us uncover new properties of important classes of functions in variational analysis. Focusing mainly on the behavior of the second subderivative and subgradient proto-derivative of polyhedral functions, functions with polyhedral epigraphs, we demonstrate that choosing the underlying subgradient, utilized in the definitions of these concepts, from the relative interior of the subdifferential of polyhedral functions ensures stronger second-order variational properties such as strict twice epidifferentia-

bility and strict subgradient proto-differentiability. This allows us to characterize continuous differentiability of the proximal mapping and twice continuous differentiability of the Moreau envelope of polyhedral functions. We close the paper with proving the equivalence of metric regularity and strong metric regularity of a class of generalized equations at their nondegenerate solutions.

Hieu Van Ha; Vu Anh Le; Tu Thi Cam Nguyen; and Hoa Duong Quang, *Classification of solvable lie algebras whose non-trivial coadjoint orbits of simply connected lie groups are all of codimension 2**

Abstract. We give a classification of real solvable Lie algebras whose non-trivial coadjoint orbits of corresponding simply connected Lie groups are all of codimension 2. These Lie algebras belong to a well-known class, called the class of MD-algebras.

Nguyen T. V. Hang and M. Ebrahim Sarabi, *A chain rule for strict twice epi-differentiability and its applications*

Abstract. The presence of second-order smoothness for objective functions of optimization problems can provide valuable information about their stability properties and help us design efficient numerical algorithms for solving these problems. Such second-order information, however, cannot be expected in various constrained and composite optimization problems since we often have to express their objective functions in terms of extended-real-valued functions for which the classical second derivative may not exist. One powerful geometrical tool to use for dealing with such functions is the concept of twice epi-differentiability. In this paper, we are going to study a stronger version

of this concept, called strict twice epi-differentiability. We characterize this concept for certain composite functions and use it to establish the equivalence of metric regularity and strong metric regularity for a class of generalized equations at their nondegenerate solutions. Finally, we present a characterization of continuous differentiability of the proximal mapping of our composite functions.

Duong Thi Huong and Pham Hung Quy, *On the frobenius closure of parameter ideals when the ring is f -injective on the punctured spectrum*

Abstract. Let (R, \mathfrak{m}) be an excellent generalized Cohen-Macaulay local ring of dimension d that is F -injective on the punctured spectrum. Let \mathfrak{q} be a standard parameter ideal of R . The aim of the paper is to prove that

$$\ell_R(\mathfrak{q}^F/\mathfrak{q}) \leq \sum_{i=0}^d \binom{d}{i} \ell_R(0_{H_{\mathfrak{m}}^i(R)}^F).$$

Moreover, if \mathfrak{q} is contained in a large enough power of \mathfrak{m} , we have

$$\mathfrak{q}^F/\mathfrak{q} \cong \bigoplus_{i=0}^d \binom{d}{i} (0_{H_{\mathfrak{m}}^i(R)}^F).$$

Nguyen Thu Hang and Truong Thi Hien, *Regularity of powers of cover ideals of bipartite graphs*

Abstract. A standard graded artinian monomial complete intersection algebra $A = \mathbb{T}[x_1, x_2, \dots, x_n] / (x_1^{a_1}, x_2^{a_2}, \dots, x_n^{a_n})$, with \mathbb{T} a field of characteristic zero, has the strong Lefschetz property due to Stanley in 1980. In this paper, we give a new proof for this result by using only

the basic properties of linear algebra. Furthermore, our proof is still true in the case where the characteristic of \mathbb{T} is greater than the socle degree of A , namely $a_1 + a_2 + \cdots + a_n - n$.

Nguyen Thu Hang and Truong Thi Hien, *Regularity of powers of cover ideals of bipartite graphs*

Abstract. Let $G = (V, E)$ be a bipartite graph over the vertex set $V = \{1, \dots, r\}$ and let $J = J(G)$ be the cover ideal of G in the polynomial ring $R = K[x_1, \dots, x_r]$. It is known that there are integers b and t_0 such that $\text{reg } J^t = d(J)t + b$ is a linear function in t for all $t \geq t_0$. In this paper, we give effective bounds for b and t_0 .

Do Trong Hoang, Hop D. Nguyen, and Quang Hoa Tran, *Asymptotic regularity of invariant chains of edge ideals*

Abstract. We study chains of nonzero edge ideals that are invariant under the action of the monoid Inc of increasing functions on the positive integers. We prove that the sequence of Castelnuovo-Mumford regularity of ideals in such a chain is eventually constant with limit either 2 or 3, and we determine explicitly when the constancy behaviour sets in. This provides further evidence to a conjecture on the asymptotic linearity of the regularity of Inc -invariant chains of homogeneous ideals. The proofs reveal unexpected combinatorial properties of Inc -invariant chains of edge ideals.

Huynh Minh Hien, *Markov partitions for the geodesic flow on compact Riemann surfaces of constant negative curvature*

Abstract. It is well-known that hyperbolic flows admit Markov par-

titions of arbitrarily small size. However, the constructions of Markov partitions for general hyperbolic flows are very abstract and not easy to understand. To establish a more detailed understanding of Markov partitions, in this paper we consider the geodesic flow on Riemann surfaces of constant negative curvature. We provide a rigorous construction of Markov partitions for this hyperbolic flow with explicit forms of rectangles and local cross sections. The local product structure is also calculated in detail.

Dinh Tuan Huynh, Ruiran Sun, Song-yan Xie, and Zhangchichen, *Entire holomorphic curves into $p^n(c)$ intersecting $n + 1$ generic hypersurfaces*

Abstract. Let $\{D_i\}_{i=1}^{n+1}$ be $n + 1$ smooth hypersurfaces in $\mathbb{P}^n(\mathbb{C})$, not all being hyperplanes, satisfying one precise geometric (generic) condition. Then, for every algebraically nondegenerate entire holomorphic curve $f : \mathbb{C} \rightarrow \mathbb{P}^n(\mathbb{C})$, we show a weak Second Main Theorem:

$$\sum_{i=1}^{n+1} \delta_f(D_i) < n + 1$$

in terms of defect inequality in Nevanlinna theory.

D.C. Huong, T.N. Nguyen, H.T. Le, *Event-triggered state estimation for nonlinear systems aided by machine learning*

Abstract. This paper considers the event-triggered state estimation problem with the aid of machine learning for nonlinear systems subject to external disturbances in the state and output vectors. First, we develop a recurrent neural network (RNN) learning algorithm to predict the nonlinear systems. Second, we design a discrete-time event-

triggered mechanism and a state observer based on this mechanism for the RNN model. This discrete-time event-triggered state observer significantly reduces the utilization of communication resources. Third, we establish a sufficient condition to ensure that the state observer can robustly estimate the state vector of the recurrent neural network. Finally, we provide an illustrative example to verify the merit of the proposed method.

Le Van Hien, *Delay-Dependent Positivity and Stability Analysis of Discrete-Time Systems with Delay*

Abstract. In this paper, delay-dependent positivity and stability conditions, which are crucially different from existing delay-independent ones, are derived for discrete-time systems with time-varying delay. By utilizing a special property called non-oscillatory behavior of solutions of scalar difference equations with delays, the proposed conditions are formulated in terms of linear programming settings. The efficiency of the obtained results is illustrated by a numerical example with simulations.

Ali Hyder and Quốc Anh Ngô, **On the hang-yang conjecture for gjms equations on S^n**

Abstract. This work concerns a Liouville type result for positive, smooth solution v to the following higher-order equation

$$\mathbf{P}_n^{2m}(v) = Q_n^{2m} (\varepsilon v + v^{-\alpha})$$

on S^n with $m \geq 2, 3 \leq n < 2m, 0 < \alpha \leq (2m + n)/(2m - n)$, and $\varepsilon > 0$. Here \mathbf{P}_n^{2m} is the GJMS operator of order $2m$ on S^n and $Q_n^{2m} = \mathbf{P}_n^{2m}(1)$ is constant. We show that if $\varepsilon > 0$ is small and $0 < \alpha \leq$

$(2m + n)/(2m - n)$, then any positive, smooth solution v to the above equation must be constant. The same result remains valid if $\varepsilon = 0$ and $0 < \alpha < (2m + n)/(2m - n)$. In the special case $n = 3, m = 2$, and $\alpha = 7$, such Liouville type result was recently conjectured by F. Hang and P. Yang (Int. Math. Res. Not. IMRN, 2020). As a by-product, we obtain the sharp (subcritical and critical) Sobolev inequalities

$$\left(\int_{\mathbb{S}^n} v^{1-\alpha} d\mu_{\mathbb{S}^n} \right)^{\frac{2}{\alpha-1}} \int_{\mathbb{S}^n} v \mathbf{P}_n^{2m}(v) d\mu_{\mathbb{S}^n} \geq \frac{\Gamma(n/2 + m)}{\Gamma(n/2 - m)} |\mathbb{S}^n|^{\frac{\alpha+1}{\alpha-1}}$$

for the GJMS operator \mathbf{P}_n^{2m} on \mathbb{S}^n under the conditions $n \geq 3, n = 2m - 1$, and $\alpha \in (0, 1) \cup (1, 2n + 1]$. A log-Sobolev type inequality, as the limiting case $\alpha = 1$, is also presented.

Hop D. Nguyen and Quang Hoa Tran, *The lefschetz properties of artinian monomial algebras associated to paths and cycles*

Abstract. We investigate ...

Hop D. Nguyen and Quang Hoa Tran, *The lefschetz properties of artinian monomial algebras associated to paths and cycles*

Abstract. In this paper, we study the weak Lefschetz property of an artinian monomial algebra A_G defined by the sum of the edge ideal of a simple graph G and the square of the variables. We classify some important classes of graphs G where A_G has or fails the weak Lefschetz property, such as paths, cycles and several tadpole graphs.

Huy Tàl Hà, A.v. Jayanthan, Arvind Kumar, and Hop D. Nguyen, *Binomial expansion for saturated and symbolic powers of sums of ideals*

Abstract. There are two different notions for symbolic powers of ideals existing in the literature, one defined in terms of associated primes, the other in terms of minimal primes. Elaborating on an idea known to Eisenbud, Herzog, Hibi, Hoa, and Trung, we interpret both notions of symbolic powers as suitable saturations of the ordinary powers. We prove a binomial expansion formula for saturated powers of sums of ideals. This gives a uniform treatment to an array of existing and new results on both notions of symbolic powers of such sums: binomial expansion formulas, computations of depth and regularity, and criteria for the equality of ordinary and symbolic powers.

Nguyen Thu Ha, *Robust stability for implicit differential equations with causal operators*

Abstract. In this paper, we consider the robust stability of implicit differential equations where the leading term is singular and the driving term is a causal linear operator. We study the solvability of linear and nonlinear equations and then the robust stability under small perturbations is established. An L_p version of Bohl-Perron Theorems for these systems is also studied.

Nguyen Thu Ha, *Robust stability for implicit dynamic equations with causal operators on time scales*

Abstract. We are very grateful to the referees for evaluating our manuscript and for providing us with precious comments and suggestions. In accordance with these comments and suggestions, we have carefully revised the paper. All the issues raised in the reports have been addressed. In what follows, we detail the changes made with respect to

the referees' suggestions and concerns. For convenience, the comments and suggestions of the referees are printed in blue, whereas our statements of revision are printed in black.

Van Kien Nguyen, Van Dung Nguyen, *Best n -term approximation of diagonal operators and application to function spaces with mixed smoothness*

Abstract. In this paper we give exact values of the best n -term approximation widths of diagonal operators between $\ell_p(\mathbb{N})$ and $\ell_q(\mathbb{N})$ with $0 < p, q \leq \infty$. The result will be applied to obtain the asymptotic constants of best n -term approximation widths of embeddings of function spaces with mixed smoothness by trigonometric system.

Vu The Khoi and Ho Minh Toan, *Metrics induced by certain hilbert-schmidt fidelities on positive semi-definite matrices*

Abstract. Motivated by measuring the degree of similarity of a pair of quantum states (density matrices), we consider the metric property of the modified Bures angles and modified Bures distances of symmetric functions which are extensions of some fidelity measures on the spaces \mathcal{P} of nonzero positive semi-definite matrices. We use the positive semi-definiteness of the Gram-type matrices to characterize the metric property of the modified Bures angles. As a consequence, we can show that the modified Bures angles induced by the geometric mean, harmonic mean, minimum and maximum of two positive numbers are metrics on \mathcal{P} . In addition, we can also show that the metric property of the modified Bures angles is stronger than that of the modified Bures distances.

Tran-Trung Nghiem, *On the regularity of conical calabi-yau potentials*

Abstract. Using pluripotential theory on degenerate Sasakian manifolds, we show that a locally bounded conical Calabi-Yau potential on a Fano cone is actually smooth on the regular locus. This work is motivated by a similar result obtained by R. Berman in the case where the cone is toric. Our proof is purely pluripotential and independent of any extra symmetry imposed on the cone.

T. G. Nam and N. T. Phuc, *On leavitt path algebras of hopf graphs*

Abstract. In this paper, we provide the structure of Leavitt path algebras of Hopf graphs associated to pairs (G, \mathfrak{r}) consisting of groups G together with ramification datas \mathfrak{r} . Consequently, we characterize the Gelfand-Kirillov dimension, the stable rank, the purely infinite simplicity and the existence of a nonzero finite dimensional representation of the Leavitt path algebra of a Hopf graph via properties of ramification data \mathfrak{r} and G .

F. G. Nam and N. T. Phuc, *On leavitt path algebras of hopf graphs*

Abstract. In this paper, we provide the structure of Leavitt path algebras of Hopf graphs associated to pairs (G, \mathfrak{r}) consisting of groups G together with ramification datas \mathfrak{r} . Consequently, we characterize the Gelfand-Kirillov dimension, the stable rank, the purely infinite simplicity and the existence of a nonzero finite dimensional representation of the Leavitt path algebra of a Hopf graph via properties of ramification data \mathfrak{r} and G .

Tran Van Nghi, Nguyen Nang Tam, *Existence and Tikhonov-type*

regularization method for generalized affine variational inequality

Abstract. In this paper, we present a sufficient condition for the solution existence of general affine variational inequality (GAVI) and use a Tikhonov-type regularization method to find a solution of GAVI. Under the suitable conditions, we characterize the unboundedness, closedness, and convexity of the solution set. The obtained results have extended and complemented previous ones.

Ho V. N. Phuong and Quang Hoa Tran, *A new proof of stanley's theorem on the strong lefschetz property*

Abstract. A standard graded artinian monomial complete intersection algebra $A = \mathbb{T}[x_1, x_2, \dots, x_n] / (x_1^{a_1}, x_2^{a_2}, \dots, x_n^{a_n})$, with \mathbb{T} a field of characteristic zero, has the strong Lefschetz property due to Stanley in 1980. In this paper, we give a new proof for this result by using only the basic properties of linear algebra. Furthermore, our proof is still true in the case where the characteristic of \mathbb{T} is greater than the socle degree of A , namely $a_1 + a_2 + \dots + a_n - n$.

Tran Dinh Phung, Dinh Thanh Duc, Vu Kim Tuan, M. Garayev, H. Guediri, *Time-fractional integro-differential equations in power growth function spaces*

Abstract. In this paper we study the global solvability of Riemann-Liouville and Caputo time-fractional integro-differential equations in a space of functions with square average power growth. We prove the uniqueness of corresponding inverse problems for one point observation.

Tat Dat Tô, *Tsuji's iteration on pseudoconvex domains*

Abstract. We give an alternative proof of Tsuji's theorem on the construction of Kähler-Einsteins on strongly pseudoconvex domain, adapting the method of Berndtsson in the compact case.

Quy Thuong Le and Khanh Hung Nguyen, *Topological zeta functions of complex plane curve singularities*

Abstract. We study topological zeta functions of complex plane curve singularities using toric modifications and further developments. As applications of the research method, we prove that the topological zeta function is a topological invariant for complex plane curve singularities, we give a short and new proof of the monodromy conjecture for plane curves.

Le Quy Thuong and Nguyen Hong Duc, *Equivariant motivic integration on special formal schemes*

Abstract. We construct, based on Nicaise's article in Math. Ann. in 2009, an equivariant geometric motivic integration for special formal schemes, such that when applying to algebraizable formal schemes, we can revisit our previous work in 2020 on equivariant motivic integration for algebraic varieties. We prove the change of variables formula for the integral by pointing out the existence of an equivariant Néron smoothing for a flat generically smooth special formal scheme. We also define the motivic Milnor fiber of a formal power series and predict that it is the right quantity to define the motivic Milnor fiber of a germ of complex analytic functions.

Pham Nguyen Thu Trang and Do Duc Thai and Pham Ngoc Mai, *Meromorphic maps of complex submanifolds in n*

Abstract. The purpose of this article is twofold. The first is to establish the Cartan-Nochka second main theorem for algebraically nondegenerate meromorphic mappings from a polydisc in \mathbb{C}^n into a projective algebraic variety sharing hypersurfaces located in N -subgeneral position. The second aim is to establish a sharp non-truncated defect relation for meromorphic mappings from an n -dimensional closed complex submanifold of \mathbb{C}^l into a compact complex manifold X sharing divisors in N -subgeneral position.

Le Van Thuyet and Truong Cong Quynh, *On the automorphism-invariance of finitely generated ideals and formal matrix rings*

Abstract. In this paper, we study rings having the property that every finitely generated right ideal is automorphism-invariant. Such rings are called right fa -rings. It is shown that a right fa -ring with finite Goldie dimension is a direct sum of a semisimple artinian ring and a basic semiperfect ring. From this, we obtain that if R is a right fa -ring with finite Goldie dimension such that every minimal right ideal is a right annihilator and the right socle is essential in R_R , R is also indecomposable (as ring), not simple with non-trivial idempotents then R is QF. In this case, QF-rings are the same as q -, fq -, a -, fa -rings. We also obtain a result of the automorphism-invariance of formal matrix rings.

Le Van Thuyet, *Abdoul djibril diallo, papa cheikhou diop and truong cong quynh*, *new characterizations of quasi-frobenius rings*

Abstract. In this paper, we firstly provide several new characterizations of quasi-Frobenius rings by using some generalized injectivity of

rings with certain chain conditions. Namely, we prove among other results, that: (1) A ring R is quasi-Frobenius if and only if R is right C_{11} , right minfull with ACC on right annihilators; (2) A ring R is quasi-Frobenius if and only if R is two-sided min- CS with ACC on right annihilators in which $\text{Soc}({}_R R) \leq_e R_R$; (3) A ring R is quasi-Frobenius if and only if R is right Johns left C_{11} ; (4) A ring R is quasi-Frobenius if and only if R is quasi-dual two-sided C_{11} with ACC on right annihilators. Moreover, we give more characterizations of quasi-Frobenius rings. For example, it is shown that a ring R is quasi-Frobenius if and only if R is a left P -injective left IN -ring with right RMC and $Z(R_R) = Z({}_R R)$. Also, we prove that if R is a right duo, right $QF - 3^+$ left quasi-duo ring satisfying ACC on right annihilators, then R is quasi-Frobenius. In this paper, several known results on quasi-Frobenius rings are reproved as corollaries.

Thang Pham, Steven Senger, Michael Tait, Vu Thi Huong Thu, *Geometric structures in pseudo-random graphs*

Abstract. In this paper, we provide a general framework for counting geometric structures in pseudo-random graphs. As applications, our theorems recover and improve several results on the finite field analog of questions originally raised in the continuous setting. The results present interactions between discrete geometry, geometric measure theory, and graph theory.

Thang Pham, *Group action and l_2 -norm estimates of geometric problems*

Abstract. In 2017, by using the group theoretic approach, Bennett,

Hart, Iosevich, Pakianathan, and Rudnev obtained a number of results on the distribution of simplices and sum-product type problems. The main purpose of this paper is to give a series of new applications of their powerful framework, namely, we focus on the product and quotient of distance sets, the L^2 -norm of the direction set, and the L^2 -norm of scales in difference sets.

Do Duc Thuan and Ninh Thi Thu, *Solvability and stability of switched discrete-time linear singular systems under Lipschitz perturbations*

Abstract. In this paper, the problem of solvability and stability for switched discrete-time linear singular (SDLS) systems under Lipschitz perturbations is studied. We first prove the unique existence of solution of SDLS systems under Lipschitz perturbations with different switching rules on two sides. The solution manifold is also described. Secondly, we derive some conditions for stability of these systems. Finally, some examples are given to illustrate the obtained results.

N. D. Toan, N.T. Dieu, N.H. Du, L. B. Dung, *Continuous dependence of stationary distributions on parameters for stochastic predator-prey models*

Abstract. This work studies the continuous dependence of the stationary distributions on the parameters for a stochastic predator-prey model with Beddington-DeAngelis functional response. We show that if the model is extinct (resp. permanent) for a parameter, it is still extinct (resp. permanent) in a neighbourhood of this parameter. In case of extinction, the Lyapunov exponent of predator quantity is negative

and the prey quantity converges almost sure to the saturated situation where the predator is absent at an exponential rate. Under the condition permanence, the unique stationary distribution converges weakly to the degenerate measure concentrated at the unique limit cycle or at the globally asymptotical equilibrium when the diffusion term tends to 0.

Report of 2022 VIASM Review Committee

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I. Functioning of the Committee

The members of the Review Committee were Professor Sir John Ball (Chair), Heriot-Watt University, Edinburgh, Professor Vũ Hoàng Linh, VNU Hanoi, Professor Claudio Arezzo, ICTP, Trieste, Italy, Professor Jean-Stéphane Dhersin, Université Sorbonne Paris Nord and CNRS, France, Professor Lê Tuấn Hoa, Institute of Mathematics, Hanoi, Professor Phan Thành Nam, LMU Munich, Germany, Professor Chengbo Zhu, NUS Singapore (unable to come to Hanoi).

The Committee met first by Zoom, together with the Scientific Director Professor Ngô Bảo Châu and Managing Director Professor Lê Minh Hà, on 22 July 2022, when they discussed the questions to be asked in the survey of stakeholders. During August the list of those to be interviewed was discussed and finalized. A summary of the responses to the survey was sent to the Committee on 16 August 2022. The Committee also had available the VIASM self-assessment report for the period 2016-2021 and the final report of the 2015 VIASM Review Committee.

The Committee (without Professor Zhu) convened at VIASM on 29-30 August 2022, when a draft of the report was prepared. At the Inauguration Ceremony for the new VIASM building on 30 August, the Chair gave a brief presentation of the report's preliminary recommendations.

The Committee thanks Professor Ngô Bảo Châu, Professor Lê Minh Hà, Dr. Trịnh Thị Thúy Giang, Dr. Bùi Thanh Tú, and the administrative staff of VIASM for their support and hospitality during the preparation of the report.

II. Evaluation of VIASM and its performance during the period 2016-2021

1. Positive opinions of mathematicians who have worked in VIASM

The members of the Committee who have regularly visited Vietnam have observed that researchers, Vietnamese, and foreigners, who have had the chance to visit VIASM have felt themselves very fortunate to have had the possibility to work in such an excellent institute. In VIASM their time can be fully dedicated to research, and it is an environment in which graduate students can learn, and where everyone can progress and do better mathematics in very good working conditions.

This feeling was confirmed by the visitors who answered the survey and by those who were interviewed by the Committee.

As demonstrated by the rest of this report, the Committee is convinced that VIASM is fundamental to Vietnamese mathematics research. For many researchers, fruitful discussions with visitors from Vietnam and abroad have led to significant improvements in their research, as confirmed by numbers of publications in leading mathematical journals. Without VIASM, the extraordinary advances in Vietnamese mathematics in recent years would not have taken place, and with its growing strength, this progress can continue.

2. Excellent direction and management of directors and senior staff

The excellent direction and management by the Board of directors and senior staff were highly appreciated both by respondents to the survey and by those interviewed by the Committee. The main mission of VIASM, namely the promotion of mathematics in Vietnam, has been fulfilled in an arguably optimal manner by the Scientific Director and the Managing Directors (present and past), given the specific conditions of the country. The researchers/guests and funded activities have been very carefully selected based on the suggestions of the Scientific Council and external experts, aligning the functionality of the Institute to the best international practice.

3. Outstanding administrative staff

A research institute of the highest international level must have an administrative team that is up to the task. From the beginning, the directors of VIASM have made a point of surrounding themselves with high-quality staff. The skills required of these staff are numerous. As the institute welcomes foreign researchers, they must be fluent in English, both in written and spoken; organizational skills are also essential; finally, staff must be capable of taking the initiative for many of the tasks they have to perform. As the responses to the survey question Q6 indicate, visitors to VIASM are fully satisfied with the administrative team: "*The survey participants all agreed that the administrative and support system of the Institute met very well the requirements for the Institute's model, functions, and tasks*" and "*All staff at VIASM are very kind and friendly, they help researchers and guests a lot during their time at the Institute*". The Committee would like to acknowledge their dedication, helpfulness, and availability.

On the other hand, the Committee is aware of the difficulty of maintaining high-quality staff, given the intense working schedule and the unattractive salary system. We believe

that recruiting new staff to key positions and finding a solution to increase the level of salaries is crucial for VIASM to keep its excellent administrative standard.

4. New level of international relations

The Committee unanimously concludes that the goal of VIASM to establish itself as a visible and recognized research center of high international status has been fully accomplished in the first ten years. VIASM has become the natural location for building and carrying out research and training projects involving the whole Vietnamese mathematical community and international experts. As confirmed by the results of the survey (in particular Q1, Q5, Q6, and Q7) and by the foreign visitors interviewed by the Committee, the working conditions provided by VIASM in the previous building were already excellent and have improved even more in the new headquarters. Various initiatives have been undertaken to expand the international breadth of VIASM activities. The Committee finds the post-doctoral program of particular importance and a very useful tool to attract young researchers from abroad to collaborate with Vietnamese colleagues. In fact, as explained below, further steps in these directions could be implemented, even starting at a Ph.D level.

VIASM international visibility is already very significant and confirmed by the scientific prestige of many of the international visitors of the past years. Important recognitions have already been achieved, such as the naming by the European Mathematical Society of VIASM as an *Emerging Regional Center of Excellence* for the periods 2013-2017 and 2019-2023. Moreover, VIASM has also been part of the Forum of Asian Institutes for Advanced Studies since 2011.

Further very promising initiatives of collaboration are under construction to enhance VIASM's international status and to increase the quantity and level of collaborations between Vietnam and the international community. In particular, important collaborations with SEAMS, ICRTM, ICTP, and CIMPA¹ have already been established while further links with IMU, TWAS, and OWSD² should be strengthened in the near future. On August 26, 2022, CNRS³, VIASM, and VAST signed an agreement, establishing from January 1, 2023, the 10th International Research Laboratory in mathematics of CNRS on

¹ Southeast Asian Mathematical Society (SEAMS), International Centre for Mathematical Research and Training (ICRTM), International Centre for Theoretical Physics (ICTP), Centre International de Mathématiques Pures et Appliquées (CIMPA).

² International Mathematical Union (IMU), The World Academy of Sciences (TWAS), Organization for Women in Science for the Developing World (OWSD)

³ Centre national de la recherche scientifique

the premises of VIASM and the Institute of Mathematics of VAST. This laboratory will be able to host French researchers for periods of up to 2 years.

In summary, it is this Committee's opinion that VIASM has achieved an excellent international status unmatched by mathematical research centers in any comparable country, and it has now the potential, with continued support by the Vietnamese Government, to become a center of reference for mathematical research in the whole of South-East Asia. In particular, it is very important for VIASM to maintain its autonomy in organizing international activities and inviting foreign scholars.

5. Initiative support young researchers

VIASM has established excellent initiatives for young researchers that have stimulated similar programs in universities and research institutions in Vietnam. A prime example is the postdoc program, which was first offered in Vietnam by VIASM, and which has been adopted by many institutions e.g., the VNU- Hanoi, VNU- Ho Chi Minh City, and the Vietnam Academy of Science and Technology (VAST). We are convinced that this program has had a very important impact not only on the mathematical community but also on the scientific community at large, as it aligns the career path of scientists in Vietnam to that common elsewhere. In the future, further actions in this direction should be encouraged. In particular, we recommend below that VIASM implement a Ph.D program following international practice, in which suitable funding for Ph.D. students is provided.

6. Good facilities and an excellent research environment in the new building

At the time of its creation, the institute used premises on the campus of Hanoi University of Science & Technology on the 7th floor, Ta Quang Buu Library. With the help of the Ministry of Education and Training, VIASM was able to move its headquarters to the former Nguyen Van Huyen Primary School at 157 Chua Lang Street, Dong Da, Hanoi. Thus, from April 2020, VIASM activities are carried out in the new building. With about 2000 square meters, the space available for VIASM's activities has been expanded four times.

The quality of the facilities should be emphasized. VIASM has a large number of offices, allowing it to accommodate about 80 people (including VIASM staff). But the most remarkable point is its capacity to host large-scale scientific events. It now has a large, perfectly functional, Lecture Hall of nearly 200 seats, to which must be added three seminar rooms for 30 to 35 people, a meeting room for 20 people and two discussion rooms for 6 to 8 people. On the 4th floor, there is a large library of 85 square meters with 1400 books and plenty of space for researchers and students to work, as well as numerous work rooms and a common room where researchers can meet, discuss, and do science.

On the 5th floor, there are again workspaces, but also 4 rooms that can accommodate up to 8 people, a canteen and a recreation room.

It should be noted that the institute is equipped with new technology, which with some improvement will reach the standard expected for this type of research center.

7. Supports mathematicians from VIASM throughout Vietnam

The choice of Hanoi as the location for VIASM was probably the most appropriate. However, the institute has clearly a national mission, and it is important that not only Vietnamese researchers from Hanoi and Ho Chi Minh City, but also from all Vietnamese universities are welcomed at VIASM so that they can exchange with each other and with international researchers visiting VIASM.

VIASM made significant efforts in this direction and provided support for mathematicians from throughout Vietnam, in particular for those from small centers, for whom the interactions with international experts are extremely valuable. Given that most mathematical researchers live in Hanoi and Ho Chi Minh City, the Committee is pleased to note that (except for 2021 because of Covid-19), more than 30% of VIASM visitors came from other centers.

During their stays at VIASM, researchers from outside Hanoi can fully concentrate on research, which is more difficult for the researchers coming from Hanoi who have to commute and may have family responsibilities and perhaps teaching duties. However, several researchers who responded to the survey, and those interviewed by the committee, point out that for researchers from outside Hanoi, and especially for women researchers, it is often logistically complicated to come to VIASM for long periods.

We also remark that for the long term, it is very important to call on universities to realize the importance of introducing a sabbatical leave scheme, for which allowing their lecturers to spend time at VIASM is a prime example.

8. Training for teachers and pupils and popularization of mathematics

As the main coordinator of the National Program for the Development of Mathematics (NPDM), VIASM actively contributed to the reform and improvement of teaching mathematics in general education. In particular, VIASM organized many training programs for teachers and pupils, as well as activities to popularize mathematics (e.g. the Math Open Day).

During the first 10 years (2010-2020), the NDPM focussed largely on mathematically gifted pupils and teachers in specialized schools. For the next 10-year period (2021-2030), besides the IMO support activities, one mission of the new NDPM is to support both teachers and pupils in the new K12 mathematics curriculum which was issued in 2018 and has been gradually implemented since 2020.

The Committee found of particular importance, also to attract new talents to mathematical studies, the efforts put by VIASM in the training of the Vietnamese team competing at the International Mathematical Olympiad (IMO). These activities were highly appreciated by the community, as clearly expressed by many participants in the interview. In the long run, we believe that the involvement of VIASM in enhancing mathematical education at the elementary level will have an important impact on the development of advanced mathematics in Vietnam.

III. List of recommendations

1. International visibility and impact

There is a unanimous agreement among Vietnamese mathematicians, partners, and foreign scientists (as evidenced by the responses to the survey questions Q1 & Q7 and stakeholders' interviews) that VIASM has played a key role in raising the level of international collaborations in Vietnam. Thanks to the superb efforts of the Scientific Director, the Managing Directors (present and past), and highly qualified staff (Q6 of the survey), VIASM has achieved after its first ten years the recognized status of an internationally competitive research center, with a huge potential for the future.

The Committee, after interviewing national and international distinguished mathematicians, suggests some steps that could consolidate and increase VIASM national and international visibility, as well as its impact on neighboring countries.

- *To consider running some long-term (e.g. 3-6 months) thematic programs, bringing together Vietnamese and international experts together with young researchers, thus creating long-lasting collaborations and expanding existing research directions;*

- *To create a VIASM Prize for young (less than or equal to 35 years of age) Vietnamese mathematicians. The Prize should carry a research grant to be spent at VIASM for a significant amount of time (ideally 1 year long) during which the recipient would give a course in their research field.*

- To facilitate mathematical research collaborations among scientists from neighboring countries in South-East Asia. This could be achieved via collaborations with international networks and institutions (e.g., SEAMS, IMU, ICMIT, ICTP, CIMPA, et al.), and by advertising and proactively stimulating applications for VIASM programs (e.g., the postdoctoral scheme) abroad.

2. Need of introducing a Ph.D research program

A central responsibility of VIASM is to support the training of young mathematicians. In this direction, the postdoc program of VIASM has been established successfully. The next step should be to introduce funding for Ph.D students so that the most talented are supported independently of family circumstances. Although such scholarships are crucial for high-quality Ph.D outcomes, unfortunately, they are currently not available in most educational institutions in Vietnam (except for some special funding coming from private companies such as Vingroup). We believe that VIASM should explore such a funding scheme as soon as possible and that this action could have a lasting impact on the development of mathematics in Vietnam. The Ph.D students would be located at VIASM with supervisors at universities in Vietnam and abroad and could incorporate a sandwich model in collaboration with foreign research institutions such as the Centre National de la Recherche Scientifique (CNRS). The students would be chosen by a competitive selection process, an element of which could be indicating a preference for one or more of a list of possible Ph.D projects submitted by potential supervisors.

3. Development of applied mathematics

VIASM may consider providing additional funding for research in applied mathematics and computer science. Current and future industrial technologies need advanced mathematics applicable to data science, machine learning, cryptography, etc and collaboration with industry is effective in promoting this.

VIASM should continue organizing scientific events such as workshops and forums to bring together people working in academic and industrial sectors, supporting real-life application projects, and encouraging collaborations of mathematicians with researchers in other fields, for example, providing a number of visiting months for such groups every year.

Thematic programs at VIASM could include mathematical modeling, scientific computing, operations research, applied statistics, and interdisciplinary sciences such as bioinformatics, mathematical finance, management science, etc.

VIASM should learn from successful academics-industry cooperation in developed countries and implement master programs/graduate schools in applied and industrial mathematics.

4. Encouraging women mathematicians

Research in mathematics is developing very rapidly in Vietnam. However, the place of women remains a big issue. Vietnam currently has only two female full professors, and only 13 female associate professors. This problem is found in many countries, but it is particularly prevalent in Vietnam. Of course this is not due to VIASM, but the institute can take measures to help develop the careers of female researchers.

The Committee notes that there are currently no women on the Scientific Council or the International Advisory Board, which does not send a positive message.

The problem begins in schools and continues during undergraduate studies, but VIASM can most easily influence the research level. The Ph.D. program proposed above should take this into account. Furthermore, the point in a career where the conditions between women and men are most unequal is at the beginning, when women have young children, and when they are hampered both in the time they can devote to research and in their mobility. Therefore, VIASM should

- Appoint women to the Scientific Council and the International Advisory Board.
- Encourage applications from women at all levels, and give preference to women in case of equal qualification.
- Take into account career breaks when evaluating research applications.
- Propose solutions so that women from outside Hanoi can, if they wish, come with their children, through providing accommodation adapted to families, and solutions for schooling and childcare.

It is also important that VIASM contributes to promoting the message that being a mathematician is an appropriate career for women in which they can excel. For example, VIASM should encourage women mathematicians to give talks in high schools, and also regularly invite women researchers from abroad and communicate widely about their presence at VIASM.

5. Branch located in Central or South Vietnam

Currently, there is a demographic imbalance of VIASM researchers, in which the number of researchers from Hanoi is far larger than the rest (Appendix 2). To improve this situation, VIASM may consider creating a second branch, ideally located in the Centre or South of Vietnam. Such a second branch might also help mitigate the difficulties faced by some researchers in making extended visits to VIASM. The role of the second branch may deviate slightly from the main branch in Hanoi, for example, the second branch could support week-long workshops (similar to CIRN, Oberwolfach) and training programs for high school teachers, or create a Mathematics Village for children (similar to Nesin Mathematics Village in Turkey) which could help a lot in popularizing mathematics. We would like to point out that such a new branch will also attract more international scholars and students, thus improving greatly the international visibility of VIASM.

6. Administrative and running costs

Over the past 10 years, the tasks of administrative staff have increased significantly. At the same time, the salaries of these staff have stagnated, which makes it extremely difficult to recruit the staff required by an institute of international standing like VIASM. VIASM is therefore faced with an inadequate number of staff in relation to the activity of the institute, but also with insufficient salaries to recruit the necessary quality personnel and keep them in the long term. It is therefore urgently necessary to increase the allocation for staff salaries, and also to find a solution (perhaps in the form of salary bonuses) so that the level of salaries is sufficient.

There are also additional costs associated with the new building, including maintenance, electricity, etc, which in the previous building were covered by the Hanoi University of Science and Technology.

7. Improvement of facilities

Working conditions are an important part of enabling high-quality research. Even if VIASM is a great help to researchers, allowing them to devote themselves fully to research, a certain number of issues were highlighted during the interviews. Researchers complained about the insufficient quality of the internet connection, and the lack of working printers. They also underlined the difficulties they have in accessing bibliographic resources (whether in the library or in online resources such as electronic access to journals). The computing infrastructure should be improved. Finally, VIASM does not have enough rooms in the guest house. More rooms should be made available to accommodate all visitors. VIASM could help visitors to solve the commuting problem from rented apartments to the office by providing bicycles/motorbikes.

8. Improvement of reporting requirements to the Ministry of Education

The Review Committee, after interviewing the VIASM's Board of directors and former principal researchers, who stayed at VIASM for several times and after studying the Regulations of Organization and Activities of VIASM signed by the Government (Article 3 and Points b) c) and d) in Article 4 in the Decision No 2343/QĐ-TTg signed on December 23, 2010), has concluded that:

- *VIASM should be guaranteed autonomy in selecting visitors. The selection of visitors is examined carefully by the Scientific Council, so it is not necessary for the list of visitors to be explained to and/or approved by the MOET. It is enough for VIASM to submit the number of visitors to be approved by the MOET as requested by Point 2 in Article 2 of the Decision 6013/QĐ-BGDDT signed on December 22, 2016.*
- *The main mission of VIASM is to create and facilitate good working conditions to promote Mathematics in Vietnam. Therefore, the number of publications done during a stay of a visitor at VIASM is not important compared with the effect of her/his stay in the research career after visiting VIASM. So, it is not necessary to request all visitors or even all research groups to have publications, while visiting VIASM.*

In general, the Committee strongly believes that it is important to respect the decisions of the Scientific Council. Moreover, it is dangerous to pay too much attention to bibliometrics or KPI systems. Bibliometrics may be useful in evaluating Vietnamese mathematics as a whole, but they can be very misleading when applied to individual researchers.

9. Need for an increase in the VIASM budget

The above recommendations imply a need to increase the overall VIASM budget, both to maintain existing activities and to fund new initiatives such as the proposed Ph.D. research program. We believe that the budget should be at least doubled within 10 years. In particular, in order to achieve the proposed goals in the next 3 years, the budget should be increased by approximately 35%.

Date: 15th October 2022

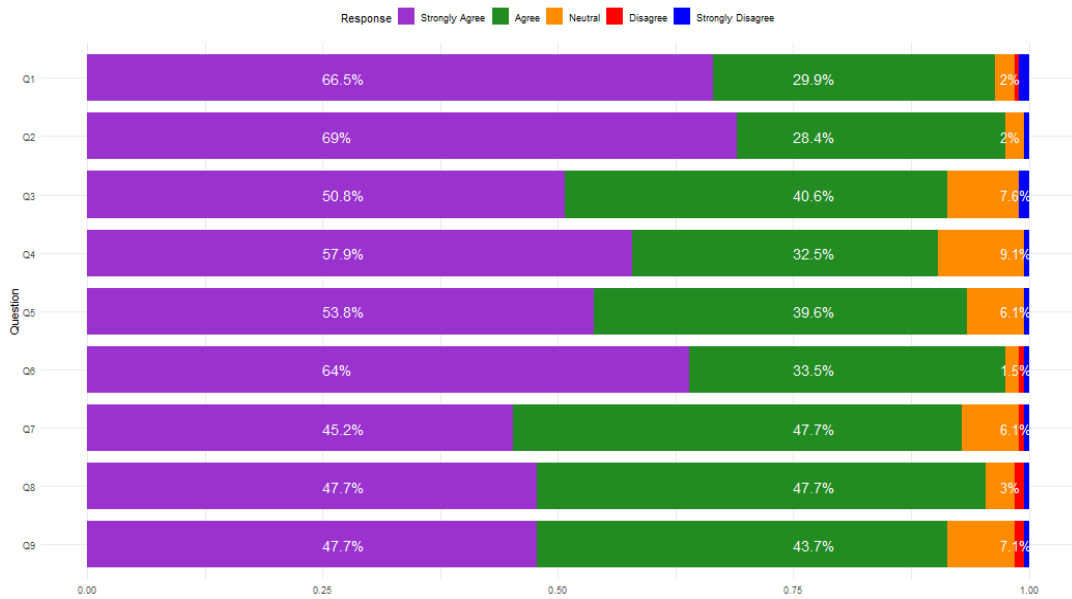
President of the VIASM Review Committee 2022



Prof. Sir John Ball

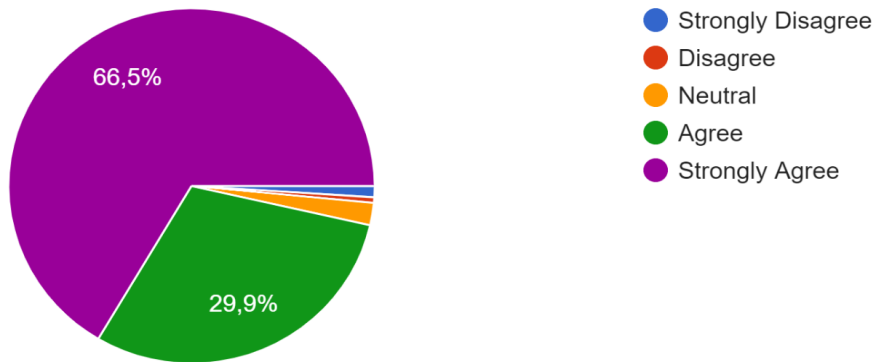
Appendix 1: Survey Results VIASM Activities 2016-2021⁴

Survey invitation: 448 people
 Results: 197 respondents.



⁴ The results (including 5-level grading and additional comments) were compiled by VIASM. The questionnaires were proposed by the Review Committee

Question 1. VIASM succeeded in creating an academic environment that meets the standards of an international research institute.

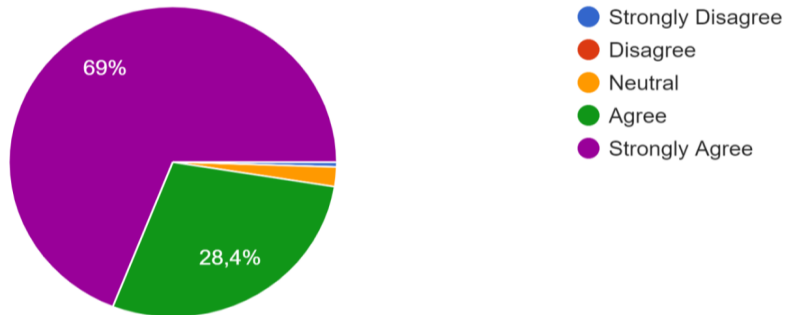


Further comments:

The survey participants all say that Vietnam is a developing country, so having a model like VIASM is absolutely necessary to develop mathematics. They also add that VIASM is a unique organization that can promote mathematical research. The academic environment is gradually approaching international standards. Many new and important results have been promptly disseminated through international conferences organized by the Institute. VIASM has invited a number of leading scientists, and many reputable international experts to work short-term. Moreover, the Institute has been recognized by the European Mathematical Society as "Emerging Regional Center of Excellence" for the period 2013-2017 and the period 2019-2023. This proves that the international reputation of the Institute has been enhanced.

However, one respondent thinks that what VIASM is lacking (to meet the standards for an international research institute) is a good library. Another respondent wrote that "I was invited to work with a two-month group study by Prof. Hai Dinh in early 7th and a group study with Dr. Vo Ngoc Thieu Cuoi in the 2nd week of June. Me and 5 other researchers were arranged to sit. I worked at a desk in the common room and I worked full-time every day. However, I received no support other than the previously reported remuneration. That amount is not enough to travel and live in Hanoi. I was explained by the staff of the Institute because of limited funds. I think the funding of the Institute is not so limited" or "Experts are invited to work in groups but in working there is only a table without any equipment, why is it called creating working conditions? I think the professionals who are invited should be paid a fair wage for the work."

Question 2. VIASM's main operating model, which consists of mixed research groups (domestic and international scientists), has had a significant impact on the development of Mathematics in Vietnam



Further comments:

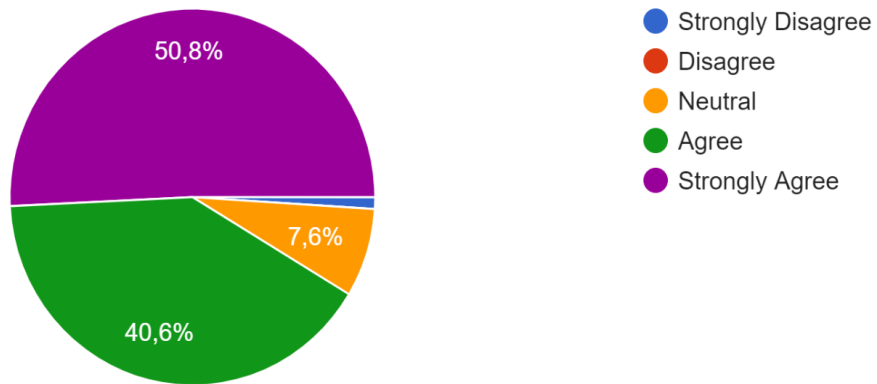
VIASM's main operating model, which consists of mixed research groups (domestic and international scientists), have had a significant impact on the development of Mathematics in Vietnam. They said that after coming to VIASM to work, they confirmed this to be true. In meetings with foreign researchers at VIASM, they felt that many of them had something in common with them. They had many opportunities to study, exchange and share ideas.

They also think that VIASM's operating model of mixed research groups is a very good way to improve both the quality and the number of publications per year by Vietnamese mathematicians. It is a fact that many young mathematicians in Vietnam cannot attend international conferences. At that time, VIASM provided a leading mathematical environment for young Vietnamese mathematicians to build a network to learn and interact with the best researchers in the world. This helps them learn and find many cooperation opportunities. And the most important thing is to exchange results, methods and ideas between domestic and foreign mathematicians to take advantage of different perspectives. Thereby, helping to promote better international links with the Vietnamese mathematical community.

Previously, mathematical researchers in Vietnam tended to work alone and did not have too many opportunities to work together for a long period of time. Many people working in the same field meet only at conferences and do not seem to have the opportunity to discuss their current research areas. Thus, the opportunities created by research projects carried out together at VIASM have created many new developments for mathematics in Vietnam. These opportunities naturally require more competition and effort from the stakeholders, but it can also benefit the future in many positive ways.

Besides, the survey participants wished that in the future the Institute could invite many famous scientists to work, helping to increase efficiency. They also pointed out some of the difficulties they encountered, saying that interacting with other agencies in Hanoi (especially VAST) was easy; meanwhile, it was very difficult for colleagues from other cities in Vietnam, especially in the South, where research is arguably more important than ever. It seems that there is a plan to establish a VIASM branch in the South, which is a reasonable idea, but the main point is again the low salary of researchers in public institutions.

Question 3. Scientific activities at VIASM (especially during the period 2016-2021) have had a significant impact on the research, training and application of Mathematics, facilitating collaboration between Mathematics and other sciences in Vietnam

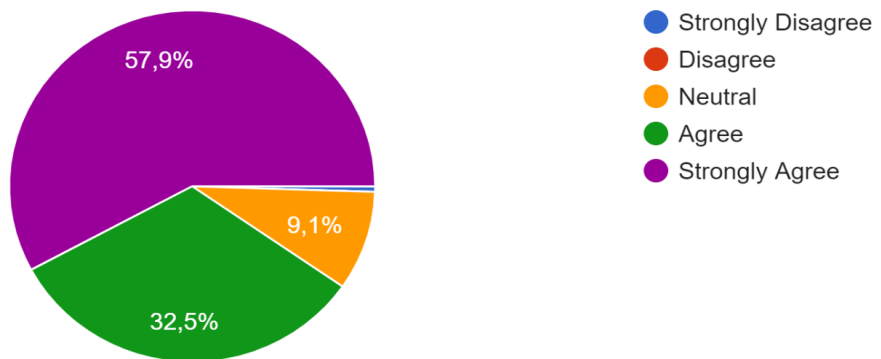


Further comments:

The results show that the professional activities of the Institute over the years have partly influenced the research, training and application of mathematics, and interdisciplinary cooperation between mathematics and other fields. Surveyors reported that there were several Applied Mathematics groups that performed very well in VIASM. Besides, VIASM's organization of the International Conference Forum "Mathematics for Industry" in November 2021 is considered a great success. In addition to pure mathematics, VIASM also pays attention to applied mathematics. It is this that encourages the search for the application of mathematics in real life in Vietnam. In addition, the connection between Mathematics and Computer Science is also very good, especially in the two major intersecting areas of information security and artificial intelligence.

They also acknowledge that while the pure math content at VIASM is quite strong, there is a need to strengthen links with applied mathematics. It is necessary to make a connection between the Institute's activities to the ongoing K12 mathematics curriculum reform. Besides, it is necessary to play a more active role in building new curriculum such as Data Science, AI, Quantitative Finance...).

Question 4. The VIASM, acting as the coordinator of the 2010-2020 National Program for the Development of Mathematics (NPDM), has been successful in aligning its activities with the NPDM objectives, making positive impact in the development of Mathematics in Vietnam

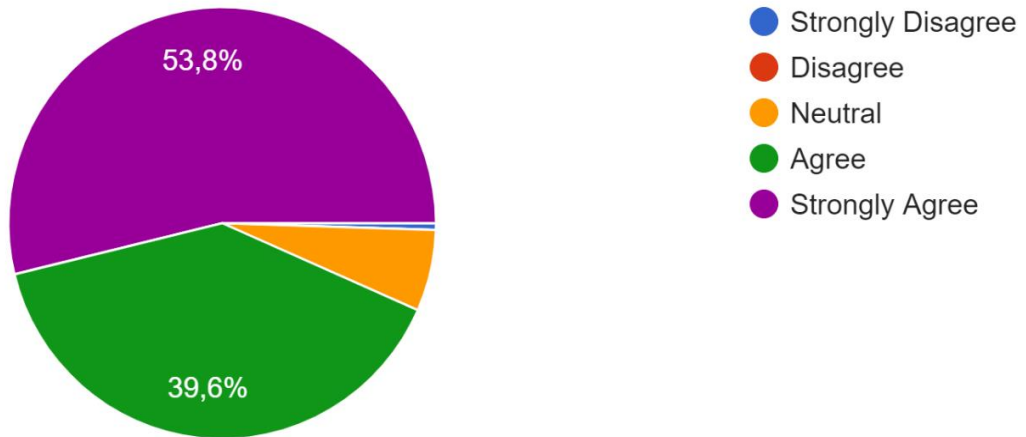


Further comments:

(Survey participants all affirmed that VIASM plays a very important role in promoting the development of Vietnamese Mathematics. They believe that Vietnam's success at IMO is a testament to the great development of the NPDM. Besides, many domestic mathematical activities have been run and organized by the Institute. VIASM, together with NAFOSTED, has facilitated scientific research for more than ten years and provided an important spiritual impetus to the Vietnamese mathematical community. VIASM's various activities have engaged people in the math community in Vietnam, connecting research groups, math events, teachers and gifted students. Furthermore, the payments they receive from the Institute help them focus on their research as the base salary they receive from the Universities is still very low.)

Question 5. After 10 years in operation, the VIASM has fulfilled its initial objectives: to become an excellent center for mathematics, creating an ideal academic environment for

scientists and university lecturers to implement mathematical ideas and research topics in both pure and applied mathematics; Providing support for talent training



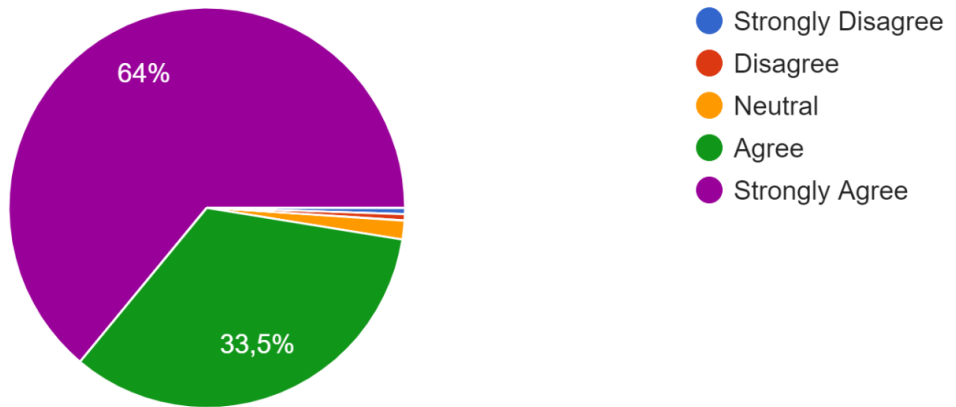
Further comments:

The respondents generally agree that after 10 years of operation, VIASM has organized many very professional activities. They think VIASM will definitely be a positive academic environment for Vietnamese mathematics.

A researcher shared that 3 months at VIASM according to him is suitable with the economic reality of the country. However, that 3-month period is quite short to allow researchers to publish a paper. He said, perhaps it takes good coordination and a longer working period to do in-depth research and produce a quality research result.

In addition, they also suggested that the Institute should try to expand its audience (especially from central and southern Vietnam). VIASM probably needs to be better integrated with the activities of other math research groups in the country. They think that the goal of implementing mathematical ideas and applied mathematics research topics in the period 2010-2020 is quite good, but the number of working groups or the number of publications in the field of applied mathematics is not much. VIASM's activities also need to be further developed, put in more effort and should be fully supported by the government.

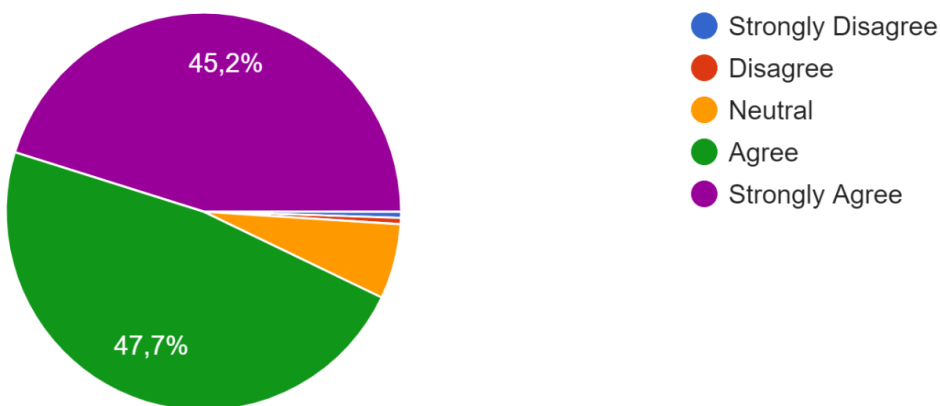
Question 6. The administrative, and the whole support system of VIASM meet the requirements for the Institute's model, functions and missions



Further comments:

The survey participants all agreed that the administrative and support system of the Institute met very well the requirements for the Institute's model, functions and tasks. All staff at VIASM are very kind and friendly, they help researchers and guests a lot during their time at the Institute. They admit that this is not something that all the world's research institutions can do. Also, "I must say that the level of English of the staff has strongly progressed during these last years, which facilitates the exchanges."

7. VIASM's infrastructure meets the standard requirements for an international research institution



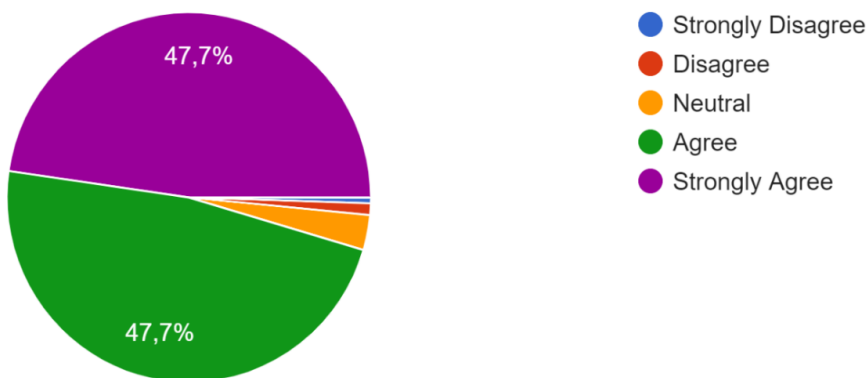
Further comments:

The obtained results show that the Institute's facilities have met most of the requirements. The researchers all said that they are always treated very well when they come to VIASM. For VIASM's new office in Chua Lang Street, the infrastructure is perfect. Compared to renting a place at Ta Quang Buu Library, Hanoi University of Science and Technology, the current facilities are much better. The Laurent Schwartz Specialty Hall is quite modern and can host in-person and online conferences. “The facility is comparable to my home

However, working equipment such as computers, printers, etc. has not been improved. They said perhaps VIASM needs to pay more attention in terms of infrastructure, especially equipment for research, computing infrastructure. The printer is always out of ink. There are not enough office desks in the room. Going forward, it will be most important to develop electronic access to high-quality math journals and other platforms. The researchers also hope that VIASM will have a permanent building of its own in the future. And finally, VIASM should have more motorbikes for researchers who are not in Hanoi.

“The online access to math journals is somewhat limited. The current common cafe is spacious and contains many interesting materials that I hope will be regularly updated and expanded. The nearby street is sometimes noisy, fortunately this only happens in the late afternoon, and apparently there is not much one can do about this. Is it reasonable to ask for some additional space where people with young kids can play with their children?”

Question 8. VIASM has been successful in promoting its activities within Vietnam and abroad.



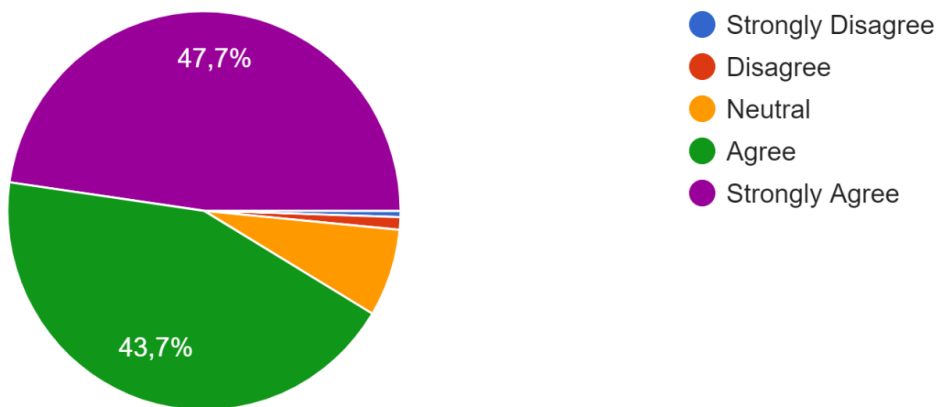
Further comments:

The researchers believe that with the influence of Prof. Ngo Bao Chau, there will certainly be many mathematicians in the world who will know about VIASM and visit VIASM to work. VIASM is a natural and reliable interlocutor for research structures such as the LIA Formath Vietnam of the CNRS in France (an IRL now). It greatly facilitates and amplifies the cooperation and makes it work smoothly. Some conferences such as the joint conference of the Mathematical Societies of the US and Vietnam a few years ago went very well.

On the other hand, communication channels such as website, facebook, ... are still not working effectively. The researcher believes that VIASM needs to continue to transmit information about the Institute to domestic and foreign units. VIASM is a good interface between the Vietnamese academic world and foreigners; however, it is highly desirable to encourage foreign guests to visit other facilities in Vietnam during their stay and not only in Hanoi but also at conferences and courses in Central and South.

Question 9. VIASM's financial mechanism (financial support for researchers and scientific activities) is appropriate and effective.

Further comments: “In my case, I received very good financial support for my visit,” said one researcher. They consider that as an international organization, it is important that VIASM has provided scholarship programs to young researchers from all over the world. The financial system, compared to the cost of living in Hanoi, is one of VIASM's strengths. They also confirmed that they have never encountered any financial problems during their working time at VIASM.



Furthermore, they believe that the additional financial support that VIASM can provide to Vietnamese mathematicians in the country is essential to sustain and motivate research. Without this support, some Vietnamese researchers would be forced to give up their research progress in exchange for teaching duties to be financially secure.

The researchers said that for the previous period (2010-2020), the financial mechanism of VIASM seems quite suitable. However, for the new phase of NPDM, they expect the Institute to more effectively support researchers and scientific activities. The researchers suggested that VIASM needs to increase financial support for researchers, even if it is necessary to reduce the number of researchers. The additional working time of group studies also needs more attention. Research in centers in Vietnam should enjoy the same benefits, avoiding the situation of local preference. They think VIASM's current financing mechanism is effective, so they hope that VIASM will receive more financial support to expand its operations to more areas of mathematical research.

Question 10. For the researchers who have visited VIASM before as well as after 2015: Please provide your comments about changes in the function of the Institute between two periods: before and after 2015 that you feel are improvement and/or shortcoming.

Further comments:

The survey results showed that all the researchers said that since 2015, the contents and activities of the Institute have improved clearly. As follows:

Working environment/facilities: The survey respondents all said that after 2015, the working environment has improved a lot, especially changed a lot in terms of facilities. The library has many books and guest houses to serve researchers. However, there is also a comment that recently the Website does not seem to be as popular as it was in the past.

Academic activities: One researcher shared, “I have only visited VIASM twice in 2018 and 2020 but I can see many changes in VIASM's infrastructure and academic activities. For example, many courses are now organized in a hybrid format (online and offline), so it is more convenient for researchers to attend these courses. They also added that compared to before, from 2015, and in the new period of NPDM (2021-2030), besides organizing seminars and talks on pure mathematics, VIASM also offers many courses to study applied mathematics. Course content at VIASM is more diverse, spanning many areas of pure mathematics and applied mathematics. VIASM's operation has been improved, professional and much better. More international mathematicians have come to work at the Institute. Many international schools and research programs have been organized. This has created a good future for mathematics in Vietnam and neighboring countries.

Support and Compensation: The researchers expressed their impression of VIASM as a very modern, youthful center of mathematics research, effectively supporting mathematicians and research groups, especially young mathematicians. The management department of the Institute provides very effective support to the Ph.D students in matters of procedural documents. Moreover, the Institute has very good support policies for Ph.D students not only in the country but also abroad. One researcher shared, “I visited VIASM once in 2018. My reception was very well organized and VIASM was very hospitable. Making payment contracts is done in a convenient and easy way. The Institute's Preprint system is also quite effective. Many publications have been referenced and cited by overseas researchers.

Researcher quality: The researchers participating in the survey all commented that after 2015, there were many foreign researchers with high research qualifications visiting VIASM and working with Vietnamese mathematicians. Many researchers expressed their hope to visit VIASM again

Although, after 2015, the Institute has changed in many positive directions. However, the researchers said that the Institute still needs more scientific activities and support for researchers from the South. Currently, most reports indicate that scientists in the South face many difficulties. In addition, a number of research groups (including many excellent mathematicians of Vietnamese origin) from abroad have come to the Institute, lacking connections with the local community, the number of people participating in and benefiting from professional lectures (of high quality) is not strictly regulated. Perhaps the Institute should pay attention to these points. The research teams at VIASM are now getting smaller. For some of the strong research communities in Vietnam, it would be better to have large research groups and a longer stay at VIASM. There are also not ideal living conditions, for

example the guest house is far from the institute. One respondent suggested moving the tea break activity from the 4th floor to the 5th floor (dining area, large space) because he/she thought it would create a better connection in the math community.

Question 11. Please provide your comment about the role of the VIASM in the development of Mathematics in Vietnam and neighboring countries.

After ten years of operation, the VIASM has provided essential support to the Vietnam mathematics research community. Most survey respondents agreed that the institute has successfully achieved its objectives as a valuable framework for organizing conferences and research-level courses. The VIASM has created opportunities for Vietnamese mathematicians to learn and collaborate with leading experts worldwide, and established international connections with a broader cross-section of Vietnam researchers and academics.

Vietnam, one of the Southeast Asian countries, is located near the western side, close to Europe. As a result, the VIASM has served as a ‘hub airport’ for researchers in Europe and Asia, offering a convenient location for all researchers. The VIASM fosters a professional and favorable working environment, with good financial support for domestic mathematicians and connections with senior international researchers. The funding from the VIASM ensures that Vietnamese mathematicians can devote sufficient time to maintaining an active research program. Moreover, as a side benefit of collaboration activities at VIASM, some new strong research groups have been formed and preliminary results have been obtained.

In organizing activities, various programs are bringing the most cutting-edge mathematics to Vietnam. Young researchers can be exposed to the latest developments in mathematics and interact with the best ones in the world. These have led to numerous fruitful research discussions and, more importantly, have rekindled the younger generation’s interest in Mathematics.

Respondents, however, are unable to observe the VIASM's efforts to build mathematics research in neighboring Southeast Asian countries.

To summarize, the role of VIASM is vital for the development of Mathematics in Vietnam. Diversification of the scientific areas of research is necessary, as well as the relations with the other mathematical institutions in the country. VIASM is already doing an excellent job in these directions and should leverage its current work and organization conditions to enforce its activities.

Question 12. Please provide your comment and suggestions for the VIASM future development.

Research areas and future development

In addition to maintaining current activities, VIASM identifies and actively supports pioneer research areas and mathematicians working with advanced problems. With short-term funding for research groups, VIASM should select some prominent research directions for long-term funding to form world-class research schools. The Institute may require permanent researchers and Ph.D students for long-term development.

Some mathematicians suggested that the VIASM should grow in scope to preside over implementing mathematics development programs from high school to undergraduate and graduate levels. Raising awareness of the role and application of mathematics in other sciences and fields such as economy, society, security - defense, and developing a system of learning materials and documents for research and teaching are all necessary.

On the contrary, according to some respondents, the Institute has done very well and should discontinue activities unrelated to 'advanced mathematics,' focusing its personnel and budget on professional academic activities. They hope that VIASM will invest more to help more researchers and groups work effectively.

- In the coming period, VIASM should maintain and encourage the development of modern research directions that are of international interest and contribute to the advancement of mathematics at the national level. VIASM may consider providing additional funding for research in applied mathematics and computer science. Current and future industrial technologies need advanced mathematics applicable to data science, and collaboration with industry is effective in promoting this.

- A research-in-pairs project open to international and local researchers based on the quality of the research program and results. Local researchers frequently have a heavy teaching load; it may be beneficial to allocate specific space to a subset of them.

- For VIASM's future development, more specific outcomes might need to be defined to measure the achievement of VIASM's objectives over time. After their visits to VIASM, the research network should be maintained.

1. International cooperation

- VIASM should extend its influence on neighboring countries and collaborate more with leading institutions in Southeast Asia to aid in the development of mathematics in this region. More intentional involvement in the development of a vibrant mathematical research community throughout Southeast Asia is a worthy goal to add to its previous expectations. International cooperation programs in this area can be developed.

- When excellent international mathematicians are unable to visit Vietnam, the network environment should be used to expand international exchanges.

- It would be advantageous to collaborate more closely with leading research centers, such as RIMS, Oberwolfach, CIRM, or Newton Institute, and to organize joint workshops, for example, or to organize thematic programs over a more extended period, as MSRI does or at the Newton Institute. The ICTP summer school activity at VIASM in 2022 is a positive sign that should be promoted further.

2. Financial support

- In the long run, VIASM should work on attracting (more) financial support/donations from private organizations and individuals.

- VIASM should consider expanding the types of funding or awards available to mathematicians to attract the world's leading mathematicians to come to work at VIASM on a long-term basis.

- According to the current regulations, the VIASM will cover travel expenses and modest salaries for researchers working abroad for a minimum of two months. It would be difficult for tenure-track international researchers because two months is a short period for a sabbatical leave. Thus, VIASM can take into account travel assistance for those who can only visit for a short time.

- If the situation allows, the VIASM tries to facilitate international exchanges by covering travel expenses.

- The VIASM should increase financial support for researchers, even if it reduces the number of researchers (compared with KIAS). The Institute could impose a quota of developed-country mathematicians in all research groups.

3. Activity expansion

- VIASM should open sub-institutes in the Central and South regions of Vietnam

- Organizing conferences/ seminars in the video conference model with a number of domestic or international universities/ research institutions.

- Building on its excellent efforts (such as the Math Open Days) to raise public awareness of the benefits and development of mathematics by demonstrating how problems/theories survive, develop, and transform themselves.

4. Nurturing young scientists

- The VIASM should continue to provide financial assistance to young mathematicians and students attending conferences. Good students may be given an 'award' in the form of the opportunity to visit the Institute and speak with International Scientists, among other things. It is possible to have a (small) award open to Vietnamese and possibly East-Asian mathematicians that are also linked to a stay at VIASM; this could broaden the resonance.

- Organizing activities for female lecturers/researchers at national training institutions to promote scientific research.

- Creating opportunities for young domestic mathematicians to work at the Institute for a longer period (minimum 6 months).

- Young researchers could be encouraged to apply for sabbatical positions.

5. Training Programs excellent doctorate in mathematics

- The VIASM should develop an excellent doctorate in mathematics (in collaboration with national and international institutions) and expand the post-doc program, with financial support for Ph.D. students and their supervisors who are carefully selected based on high criteria, according to international standards. The essential point is to train young researchers jointly with foreign supervisors so that they could return to work in Vietnam while maintaining strong links with the foreign universities they have attended.

- Some structures could be beneficial to assist the doctoral students in Vietnam (scholarships, training programs, vetting and support of the advisors, travel funds, etc)

6. Scientific activities

- The institute may organize more frequent activities such as thematic terms or thematic years to set the focus on specific research fields, particularly in pure mathematics. These are excellent opportunities to welcome experts in those fields, whose seminars and lectures would be highly beneficial to Vietnamese. Organizing a rich palette of varied short-term programs that bring in mathematicians from around the world would most likely be a good way.

- VIASM should engage in joint activities with other institutes in neighboring countries.

- The courses could be recorded and/or made available online.

- An exciting possibility would be to consider organizing research meetings in the style of Banff's BIRS or Marseilles' CIRM, where local and overseas mathematicians gather to discuss and progress on some specific problem.

- VIASM could be a venue for regular seminars bringing together people from Vietnam and neighboring countries and visitors working in specific fields. For instance, the

algebraic K-theory in Paris ran for many years based on a monthly meeting (or slightly less) with four talks. There were visitors and people from Paris, Strasbourg, Switzerland, and the Netherlands. Such a seminar (even two or three times a year) where people can discuss research and, mainly, isolated people is always beneficial.

7. Facilities

- Attempting to improve better access to mathematical research literature
- Improving housing and transportation conditions for researchers
- The website could also stand to be improved

8. Promotional activities

- VIASM should be more widely publicized, for example, by posting information on relevant international websites. A more defined internal structure in research areas (center) would boost VIASM's visibility.

Appendix 2: VIASM researcher demography⁵

TT	Tiêu chí cụ thể/ Criteria	Unit	2016	2017	2018	2019	2020	2021
1	Số hồ sơ đăng ký/ Submitted applicants	tháng- người/ Man- months	832	832	871	828	909	824
2	Số hồ sơ được chọn/ Selected applicants	tháng- người/ Man- months	278	353	274	329	220	263
3	Tỷ lệ chọn/ Acceptance rate		0.33	0.42	0.31	0.397	0.24	0.32
4	Số hồ sơ đăng ký (4=5+6+7)/ Submitted applicants (in details)	hồ sơ/ applicants	86	49	61	66	65	59
5	Nhóm/ Group	hồ sơ/ applicants	40	31	39	40	39	36
6	Cá nhân/ Individuals	hồ sơ/ applicants	15	5	4	12	13	7
7	Postdoc	hồ sơ/ applicants	31	13	18	14	13	16
8	Số hồ sơ được chọn (8=9+10+11)/ Selected applicants (in details)	hồ sơ/ applicants	30	32	26	33	28	24
9	Nhóm/ Group	hồ sơ/ applicants	15	23	18	23	20	19
10	Cá nhân/ Individuals	hồ sơ/ applicants	10	4	3	5	4	3
11	Postdoc	hồ sơ/	5	5	5	5	4	5

⁵ This data is from VIASM

		applicants						
12	Vùng miền/ Locations		69	87	77	85	85	89
13	Hà Nội/ Hanoi	người/ researchers	46	58	47	52	51	73
14	Tỉnh ngoài Hà Nội/ Other locations within Vietnam	người/ researchers	23	29	30	33	34	16

Appendix 3: Operating budget for Institute’s regular tasks from 2017 to 2021⁶

No	Content	Year 2017	Year 2018	Year 2019	Year 2020	Year 2021
1	Task 1: Promoting high-quality mathematics research and developing an advanced academic environment	6.750	6.990	7.764	8.495	7.228
2	Task 2: Promoting international cooperation	1.466	1.679	1.989	1.255	1.625
3	Task 3: Nurturing talent and strengthening the mathematics pipeline	1.987	1.210	1.979	1.320	526
4	Task 4: Implementing Institute's other regular tasks	5.439	5.496	5.378	4.205	3.913
	Total	15.642	15.375	17.110	15.275	13.292

⁶ This data is from VIASM

DANH SÁCH KHÁCH MỜI VÀ NGHIÊN CỨU VIÊN NĂM 2022

VISITING SCHOLARS AND RESEARCH FELLOWS IN 2022

TT/No	Họ và tên/ Name	Cơ quan/ Institution
I. Nghiên cứu viên/ Research fellows		
1	Phạm Kỳ Anh	Trường ĐH Khoa học Tự nhiên, ĐHQGHN (VNU - University of Science)
2	Đào Nguyên Anh	Trường ĐH Kinh tế TP.HCM (University of Economics HCMC)
3	Ngô Quốc Anh	Trường ĐH Khoa học Tự nhiên, ĐHQGHN (VNU - University of Science)
4	Nguyễn Việt Anh	Trường ĐH Tổng hợp Lille, Pháp (Université de Lille)
5	Chérif Amrouche	ĐH Tổng hợp Pau et Pays de l'Adour, Pháp (Université de Pau et des Pays De L'adour)
6	Phạm Ngọc Ánh	Viện Hàn lâm Khoa học Hungary (Hungarian Academy of Sciences)
7	Tushar Bag	Viện Công nghệ Ấn Độ (Indian Institutes of Technology)
8	Tạ Quốc Bảo	Trường ĐH Quốc Tế, ĐHQG TP.HCM (VNUHCM - International University)
9	Đào Phương Bắc	Trường ĐH Khoa học Tự nhiên, ĐHQGHN (VNU - University of Science)
10	Nguyễn Trọng Bắc	Trường ĐH Kinh tế và Quản trị Kinh doanh, ĐH Thái Nguyên (Thainguyen University - University of Economics & Business Administration)
11	Jorge Cely	
12	Pablo Portilla Cuadrado	ĐH Lille, Pháp (Université Lille)
13	Đoàn Trung Cường	Viện Toán học, Viện Hàn lâm KHCNVN ((Institute of Mathematics - VAST)
14	Đỗ Việt Cường	Trường ĐH Khoa học Tự nhiên, ĐHQGHN (VNU - University of Science)

15	Mouez Dimassi	ĐH Bordeaux, Pháp (Bordeaux Université)
16	Nguyễn Tuấn Duy	Trường ĐH Tài chính - Marketing (University of Finance - Marketing)
17	Đình Dũng	Viện Công nghệ Thông tin, ĐHQGHN (VNU - Institute of Information Technology)
18	Lê Xuân Dũng	Trường ĐH Hồng Đức (Hong Duc University)
19	Nguyễn Hữu Dư	Trường ĐH Khoa học Tự nhiên, ĐHQGHN (VNU HN - University of Science)
20	Phạm Thành Dương	Trường ĐH Việt Đức (Vietnamese - German University)
21	Đỗ Thái Dương	Viện Toán học, Viện Hàn lâm KHCNVN ((Institute of Mathematics - VAST)
22	Trịnh Viết Dực	Trường ĐH Khoa học Tự nhiên, ĐHQGHN (VNU - University of Science)
23	Tô Tất Đạt	ĐH Sorbonne, Pháp (Sorbonne Université)
24	Trịnh Thanh Đèo	Trường ĐH Khoa học Tự nhiên, ĐHQG TP.HCM (VNUHCM - University of Science)
25	Lưu Hoàng Đức	Viện Toán học, Viện Hàn Lâm KHCNVN (Institute of Mathematics - VAST)
26	Nguyễn Hồng Đức	Trường ĐH Thăng Long (Thang Long University)
27	Đình Thanh Đức	Trường ĐH Quy Nhơn (Quy Nhơn University)
28	Nguyễn Thu Hà	Trường ĐH Điện Lực (Electric Power University)
29	Roozbeh Hazrat	ĐH Western Sydney (Western Sydney University)
30	Vũ Thị Ngọc Hà	ĐH Bách Khoa Hà Nội (HaNoi University of science and technology)
31	Lê Ánh Hạ	Trường ĐH Khoa học Tự nhiên, ĐHQG TP.HCM (VNUHCM - University of Science)
32	Phùng Hồ Hải	Viện Toán học, Viện Hàn lâm KHCNVN (Institute of Mathematics - VAST)
33	Trịnh Ngọc Hải	ĐH Bách Khoa Hà Nội (HaNoi University of science and technology)

34	Đình Quang Hải	Trường ĐH Kent State, Mỹ (Kent State University)
35	Ông Thanh Hải	Trường ĐH Khoa học Tự nhiên, ĐHQG TP.HCM (VNUHCM - University of Science)
36	Phạm Việt Hải	ĐH Bách Khoa Hà Nội (HaNoi University of science and technology)
37	Nguyễn Thu Hằng	Trường ĐH Khoa học, Đại học Thái Nguyên (TNUS - Thai Nguyen University of Science)
38	Nguyễn Thị Vân Hằng	Viện Toán học, Viện Hàn Lâm KHCNVN (Institute of Mathematics - VAST)
39	Trương Thị Hiền	Trường ĐH Hồng Đức (Hong Duc University)
40	Lê Văn Hiện	Trường ĐH Sư phạm Hà Nội (Hanoi National University of Education)
41	Lê Văn Hiến	Trường ĐH Hà Tĩnh (Ha Tinh University)
42	Lê Thanh Hiếu	Trường ĐH Quy Nhơn (Quy Nhon University)
43	Ngô Trung Hiếu	ĐH Bách khoa Hà Nội (Hanoi University of science and technology)
44	Hà Văn Hiếu	Trường ĐH Kinh tế Luật TP.HCM (VNUHCM, University of Economics and Law)
45	Lê Tuấn Hoa	Viện Toán học, Viện Hàn lâm KHCNVN (Institute of Mathematics - VAST)
46	Trần Quang Hóa	Trường ĐH Sư Phạm, ĐH Huế (Hue University of Education)
47	Nguyễn Văn Hoàng	Trường ĐH FPT (FPT University)
48	Đỗ Trọng Hoàng	ĐH Bách Khoa Hà Nội (HaNoi University of science and technology)
49	Nguyễn Đăng Hợp	Viện Toán học, Viện Hàn lâm KHCNVN (Institute of Mathematics - VAST)
50	Hung P. Tong - Viet	ĐH Binghamton, Mỹ (Binghamton University)
51	Đặng Quốc Huy	Viện Nghiên cứu cao cấp về Toán (VIASM)

52	Nguyễn Thiệu Huy	ĐH Bách Khoa Hà Nội (HaNoi University of science and technology)
53	Nguyễn Ngọc Hưng	ĐH Akron, Mỹ (Akron University)
54	Võ Hoàng Hưng	Trường ĐH Sài Gòn (Saigon University)
55	Dương Thị Hương	Trường ĐH Thăng Long (Thang Long University)
56	Trịnh Thị Hường	Trường ĐH Thương Mại (Thuongmai University)
57	Đinh Công Hường	Trường ĐH Quy Nhơn (Quy Nhơn University)
58	Vũ Thế Khôi	Viện Toán học, Viện Hàn lâm KHCNVN (Institute of Mathematics - VAST)
59	Lương Đăng Kỳ	Trường ĐH Quy Nhơn (Quy Nhơn University)
60	Keonhee Lee	ĐHQG Chungnam, Hàn Quốc (Chungnam National University)
61	Nguyễn Văn Kiên	Trường ĐH Giao thông Vận tải (University of Transport and Communications)
62	Ngô Hoàng Long	Trường ĐH Sư phạm Hà Nội (Hanoi National University of Education)
63	Phan Thành Nam	ĐH Ludwig Maximilian München, Đức (Ludwig Maximilian University of Munich)
64	Trần Giang Nam	Viện Toán học, Viện Hàn lâm KHCNVN (Institute of Mathematics - VAST)
65	Trần Văn Nghị	Trường ĐH Sư phạm Hà Nội 2 (Hanoi Pedagogical University No 2)
66	Trần Thị Hiếu Nghĩa	Trường ĐH Sư phạm TP. HCM (Ho Chi Minh City University of Education)
67	Trần Hoài Ngọc Nhân	Trường ĐH Sư phạm Kỹ thuật Vĩnh Long (Vinh Long University of Technology Education)
68	Nguyễn Xuân Việt Nhân	TT Toán học ứng dụng Basque, Tây Ban Nha (Basque Center for Applied Mathematics - BCAM)

69	Trần Minh Ngọc	ĐH Sydney, Úc (Sydney University)
70	Lâm Hoàng Nguyên	ĐH Memorial of Newfoundland, Canada (Memorial University of Newfoundland)
71	Nguyễn Thanh Nguyên	ĐHQG Chungnam, Hàn Quốc (Chungnam National University)
72	Trần Thị Kim Oanh	ĐH Bách khoa Hà Nội (Hanoi University of science and technology)
73	Ngô Tấn Phúc	Trường ĐH Đồng Pháp (Dong Thap University)
74	Trần Đình Phụng	Trường ĐH Tài chính - Marketing (University of Finance - Marketing)
75	Nguyễn Thanh Phương	Trường ĐH L'Aquila, Ý (The University of L'Aquila)
76	Phạm Hùng Quý	Trường ĐH FPT (FPT University)
77	Trương Công Quỳnh	Trường ĐH Sư phạm, ĐH Đà Nẵng (University of Technology and Education - University of Da Nang)
78	Guillermo Peñafort Sanchis	Trường ĐH Valencia, Tây Ban Nha (Universitat de València)
79	Abhay Kumar Singh	Viện Công nghệ Ấn Độ (Indian Institutes of Technology)
80	Fujie Setsuro	ĐH Ritsumeikan, Nhật Bản (Ritsumeikan University)
81	Đỗ Đức Thái	Trường ĐH Sư phạm Hà Nội (Hanoi National University of Education)
82	Nguyễn Ngọc Thạch	ĐHQG Chungnam, Hàn Quốc (Chungnam National University)
83	Nguyễn Tất Thắng	Viện Toán học, Viện Hàn lâm KHCNVN (Institute of Mathematics - VAST)
84	Phạm Văn Thắng	Trường ĐH Khoa học Tự nhiên, ĐHQGHN (VNU - University of Science)

85	Nguyễn Văn Thiện	Trường ĐH FPT (FPT University)
86	Võ Ngọc Thiệu	Trường ĐH Tôn Đức Thắng (Ton Duc Thang University)
87	Đỗ Đức Thuận	ĐH Bách Khoa Hà Nội (Hanoi University of science and technology)
88	Lê Văn Thuyết	Trường ĐH Sư phạm, ĐH Huế (Hue University of Education)
89	Lê Quý Thường	Trường ĐH Khoa học Tự nhiên, ĐHQGHN (VNU - University of Science)
90	Trịnh Duy Tiến	Trường ĐH Sư phạm Hà Nội (Hanoi National University of Education)
91	Đình Sĩ Tiếp	Viện Toán học, Viện Hàn lâm KHCNVN (Institute of Mathematics - VAST)
92	Hồ Minh Toàn	Viện Toán học, Viện Hàn lâm KHCNVN (Institute of Mathematics - VAST)
93	Trần Nam Trung	Viện Toán học, Viện Hàn lâm KHCNVN (Institute of Mathematics - VAST)
94	Bùi Anh Tuấn	Trường ĐH Khoa học Tự nhiên, ĐHQG TP.HCM (VNUHCM - University of Science)
95	Huỳnh Đình Tuấn	Trường ĐH Sư phạm, ĐH Huế (Hue University of Education)
96	Vũ Kim Tuấn	ĐH West Georgia, Mỹ (University of West Georgia)
97	Phạm Trường Xuân	Trường ĐH Thủy lợi (Thuyloi University)

II. Khách mời/ Visiting scholars

1	Đỗ Ngọc Diệp	Trường ĐH Thăng Long (Thang Long University)
2	Đặng Tuấn Hiệp	Trường ĐH Đà Lạt (Dalat University)
3	Higuchi Kenta	ĐH Ehime, Nhật Bản (Ehime University)
4	Vũ Đức Việt	ĐH Cologne, Đức (University of Cologne)

5	Võ Thị Bích Khuê	Trường ĐH Tài chính - Marketing (University of Finance - Marketing)
6	Han Mao Kiah	Trường KH Vật lý và Toán học, Singapore (School of Physical and Mathematical Sciences - Nanyang Technological University)
7	Jihoon Lee	ĐHQG Chungnam, Hàn Quốc (Chungnam National University)
8	Lê Hoàng Mai	Trường ĐH Đồng Tháp (Dong Thap University)
9	Phạm Tiến Sơn	Trường ĐH Đà Lạt (Dalat university)
10	Lê Anh Vũ	Trường ĐH Kinh Tế Luật, ĐHQG TP.HCM (VNU HCM - University of Economics and Law)