

## **SIAM Activity Group Financial Mathematics and Engineering Charter Renewal Application**

This CHARTER RENEWAL applies to the SIAM Activity Group on Financial Mathematics and Engineering. The SIAM Activity Group (or SIAG) to which this renewal applies was originally formed under the aegis of SIAM on March 26, 2003 by the SIAM Council and on December 7, 2002 by the SIAM Board of Trustees with its initial operating period beginning January 1, 2003 and ending December 31, 2005. Its charter has been renewed by the Council and Board nine times thereafter.

This SIAG has 515 members, including 288 student members as of December 31, 2022.

It is the purpose of the SIAM Activity Group on Financial Mathematics and Engineering to foster activity in the area of financial mathematics, financial computation, and financial engineering. Its goals are listed below. According to its Rules of Procedure, the objective(s) of the SIAG are:

- To foster collaborations among mathematical scientists (including probability, statisticians, functional analysts interested in stochastic control and dynamic programming, numerical analysts interested in the numerical solution of parabolic PDEs), computer scientists, computational scientists, data scientists, and researchers and practitioners in finance and economics;
- To foster collaborations in those areas of research related to theory and to the development and use of mathematical and computational tools in quantitative finance in the public and private sector;
- To promote and facilitate the development of financial mathematics and engineering as an academic discipline.

Within the framework of SIAM, the SIAG will conduct activities that implement its purposes.

The SIAG on Financial Mathematics and Engineering will organize activities in financial mathematics. The SIAG is expected to:

- 1) Organize minisymposia at the SIAM Annual Meeting on years where there is no SIAG conference.
- 2) Organize a track of at least six minisymposia at the SIAM Annual Meeting at least once every five years. The VP for Programs and the VP at Large will coordinate the scheduling with the SIAG chairs.

Other activities can include:

3) Broker partnerships between academia, industry, and government. The SIAG will seek to facilitate the establishment of academic programs in FME and to foster its development as an academic and research discipline. The SIAG also will facilitate the placement of undergraduate and graduate students in internships in industry and government.

4) Work with other societies, such as the American Mathematical Society (AMS), Institute of Mathematical Statistics (IMS), and Institute for Operations Research and the Management Sciences (INFORMS) to promote financial mathematics and engineering. The SIAG will work with other professional societies and industry groups to promote FME. For example, SIAM and another society

might organize a workshop on a topic of mutual interest. The SIAG also would attempt to increase government support for FME through various outreach activities.

5) With the approval of the SIAM Program Committee, the SIAG may organize special sessions at SIAM meetings, and conduct special one- or two-day meetings immediately before or after a regular SIAM meeting. Other SIAG meetings may be organized only with the approval of the SIAM president and vice president for programs.

6) SIAG meetings, workshops, and conferences may be organized only with the approval of the SIAM president and the SIAM vice president for programs.

To which have been added:

- **SIAG/FME Early Career Prize:**  
The SIAM Activity Group on Financial Mathematics and Engineering (SIAG/FME) Early Career (formerly Junior Scientist) Prize, established in 2010, is awarded to an outstanding junior researcher in the field of financial mathematics for distinguished contributions to the field in the three calendar years prior to the year of the award.
- **SIAG/FME Student Prize:**  
This prize is awarded by the SIAM Activity Group on Financial Mathematics & Engineering (FME). It aims to recognize outstanding research presented by students and/or postdocs at the biennial SIAM conference on FME. Up to six finalists will be selected to present their work and up to two awards are made at each conference; each award has equal merit and each winner receives a \$200 prize. It was established in 2014.

The SIAG has complemented SIAM's activities and supported its proposed functions. The answers to the questions below indicate how this was accomplished and what the officers propose as the future directions for the SIAG.

*1) List all current officers of the activity group (including advisory board, if relevant).*

Chair: Igor Cialenco

Vice Chair: Luitgard A. M. Veraart

Program Director: Samuel Cohen

Secretary: Tomoyuki Ichiba

*2) How is the field covered by the activity group doing? Is it growing, is the focus shifting? What have been the significant advances over the last two years?*

The FME field is a highly active area that addresses new challenges and directions in applied mathematics and finance. It is both a vibrant research field and contributes significantly to education with many successful degree programs.

While research interest in the classical areas of FME remains strong, several new research areas have attracted more interest recently. During the last two years, further advances in financial technology (FinTech), the challenges faced by the global economy, and a stronger awareness of environmental

aspects in economics and finance (Green Finance) have sparked interest in new research directions and strengthened the existing recent research efforts in these areas. There is now a great interest in all aspects of financial technology. For example, more data-driven approaches and artificial intelligence are used in the FME field. This applies to classical research directions, such as pricing and hedging of derivatives or optimal investment decisions, and more recent directions, such as algorithmic and high-frequency trading and risk management. Also driven by the advances in technology is the increase in interest in decentralized finance.

The global economy is still facing many challenges. Disrupted supply chains, a surge in inflation, and the regulatory response to increased interest rates have led to new modelling efforts for informed decision-making under these circumstances. Recent bank failures have again demonstrated that financial risk management and financial regulation remain key areas for further research. Mathematical modelling has never been more important to contribute towards economic recovery. The recent field of Green Finance has also attracted several new contributions from the FME community. These include, for example, environmental aspects and potential regulatory changes in investment, pricing, hedging, and risk management considerations.

*3) How is the activity group doing? Is it remaining vibrant? Is the size of the SIAG stable or increasing? How is the SIAG keeping up with the changes in the field? How are the broader interests of SIAM reflected in the activities of the SIAG?*

The SIAG FME is a dynamic and diverse community that engages in a variety of activities, including organizing events, summer school, minisymposia at SIAM Annual Meetings and ICIAM, contributing to SIAM News, publishing its newsletter, and running a virtual research seminar, among others.

Despite a slight decrease in the total number of members from the previous year, the group remains SIAM's primary outlet for financial mathematicians and engineers, with a stable size. The SIAM FME has moved up in the ranking among the SIAM activities group by size from 13th place in 2021 to 10th in 2023, with 512 members, which we anticipate will increase closer to the FM23 conference. Of these members, 288 are nonstudent members, and 227 are student members. The group is actively working towards recruiting new members and retaining existing ones. The SIAG FME is a diverse and international body, with approximately 40% of members being foreign and 26% being from industry, government, research laboratories, and regulatory bodies.

The SIAG FME Conference, now in its ninth edition, has become a significant event in the international quantitative finance community. The FM21 held virtually registered 411 participants, a new high for the series (excluding the meetings held jointly with SIAM AN). The conference covers all areas of mathematical finance, including cutting-edge emerging topics such as deep learning, reinforcement learning, big data, mean-field and mean-fielded games, economics of climate change, and decentralized finance. The FM23 will feature panel discussions and tutorials on emerging topics such as signature methods in finance and decentralized finance, as well as a panel discussion, focused on "The Next Decade of Quantitative Finance - Likely Challenges and Directions." The SIAG FME raised a record amount of sponsorship for FM23.

The SIAG FME puts special emphasis on promoting early career members by organizing a poster session, conference paper prize, early career award, special minisymposia, and allocates dedicated spots at virtual seminars for talks by early career scientists.

The SIAM Journal on Financial Mathematics, associated with the SIAG FME, is recognized as a top journal in the area of applied and theoretical mathematical finance. The SIAG FME has invited the editor-in-chief to meet the community in a public forum at FM23 to give an overview of the aim and plans for SIFIN, answer questions, and receive feedback from the audience.

The SIAG FME is an agile and forward-looking group, leading the community in adjusting to the fast-changing field of quantitative finance. This is reflected in the scientific programs of the events organized by the group and the papers published in SIFIN and SIAM News.

*4) Please list conferences/workshops the activity group has sponsored or co-sponsored over the past three years and give a brief (one sentence or phrase) indication of the success or problems with each.*

SIAG/FME Virtual Seminars: The SIAG/FME activity group has organized the monthly virtual seminar series since April 2020.

SIAM AN 21, July 19-24, 2021: The SIAG/FME activity group sponsored 11 mini-symposia that covers market microstructure, systemic risk, risk management, machine learning for finance, optimal transport, game-theoretic models of finance and volatility modeling.

SIAM FM 21, June 1-4, 2021: It featured 8 invited plenary speakers, 47 mini-symposia, 61 contributed talks, 2 mini-tutorials (Trading with Friction by Mete Soner (Princeton University) and Paolo Guasoni (Dublin City University, and Machine Learning for Finance by Maxime Bergeron (Riskfuel Inc) and Sebastian Jaimungal (University of Toronto) with 411 participants.

SIAM AN 22, July 11-15, 2022: The SIAG/FME activity group sponsored 8 mini-symposia covering a wide range of topics in modern quantitative finance.

AMS-EMS-SMF Joint International Meeting, Grenoble (France) July 18-22, 2022: Special session on Financial Mathematics was organized by Beatrice Acciaio (ETH), Carole Bernard (Grenoble Ecole de Management), and Stephan Sturm (Worcester Polytechnic Institute).

Gene Golub SIAM Summer School (G2S3), August 1-12, 2022: the SIAG/FME hosted the prestigious G2S3 summer school at Gran Sasso Science Institute (GSSI) in L'Aquila, Italy. The school focused on the following topics - Quantitative Risk Management (by Ludovic Tangpi, Princeton University); Energy and Commodity Markets (by Mike Ludkovski, UC Santa Barbara); Machine Learning and Financial Technology (by Matthew Dixon, Illinois Institute of Technology); and Mean Field Games (by Roxana Dumitrescu, King's College London).

*5) Please indicate the number of minisymposia directly organized by the activity group at the last two SIAM annual meetings. When did the SIAG last organize a track at an annual meeting or meet jointly with the SIAM Annual Meeting?*

The SIAG FME organized 8 minisymposia (with a total of 14 sessions) at SIAM AN22, in Pittsburgh, in July 2022. The range of topics spanned the full range of modelling and applications and included sessions on systemic risk, stochastic control, mean-field games, machine learning in finance, and the mathematics of fintech.

The SIAG organized 10 sponsored minisymposia at SIAM AN20 (The 2nd Joint SIAM and CAIMS), which was held online in July 2020, on a wide range of topics, such as asymptotic methods in portfolio optimization, model uncertainty in finance, mathematics, and computation of financial technology, finance, and climate change, deep learning in finance, environmental finance.

*6) Please indicate other activities sponsored by the activity group, to include newsletters, prizes and web sites. Have each of these been active and successful?*

The SIAG/FME activity group awarded Early Career Prize (Ariel Neufeld, Nanyang Technological University, Singapore), 2 Conference Paper Prizes (Jana Hlavinova, WU Vienna, Austria and Gabriela Kovacova, WU Vienna, Austria) in SIAM FME 21.

The group published two newsletters in Spring 2022 and Fall 2022. The announcements were made through the SIAM ENGAGE platform and SIAG/FME webpage.

Together with the Bachelier Finance Society, the SIAG/FME activity group endorsed and supported the Mathematical Finance Mentoring Initiative <https://sites.google.com/view/finmathmentor/home>

*7) What activities are planned and proposed for the next period of the charter? Please describe scheduled and suggested future activities in detail.*

The virtual FME seminar series started during the COVID-19 pandemic, will continue (tentatively) monthly. Seminars will run remotely using Zoom. A wide range of research directions within FME will be presented in these seminars. There will be opportunities for young researchers to present their research.

The next SIAM Conference on Financial Mathematics (FM23) will take place in Philadelphia, Pennsylvania, US, from June 6-9, 2023. There will be eight plenary talks, two minitutorials (on decentralized finance and blockchain technology and signature methods in finance), prize lectures for the SIAG FME Early Career Prize and the SIAG FME Conference Paper Prize, a panel discussion, and a large number of minisymposia and contributed talks. The SIAG FME plans to hold the next edition of the FM conference in the Summer of 2025.

The SIAG FME will continue to publish 1-2 newsletters per year. Additionally, the activity group will continue liaising with SIAM News to suggest topics from the field of FME for SIAM News articles.

The activity group plans to organize a programming competition following the success of the programming competition held at the FM21 conference. This time the programming competition will be organized as a stand-alone event, with a final presentation in Fall 2023. Teams consisting of a small number of students will solve some practical challenges in the FME field.

The SIAG FME will continue organizing mentoring events for junior researchers from underrepresented groups. The SIAG FME plans to have a solid representation at the SIAM annual meetings and ICIAM. It will also look into organizing regional meetings and events and provide support for promoting related events. The activity group will continue to build connections with industry.

*8) How can SIAM help the activity group achieve its goals?*

Renew the SIAG charter, which will ensure that the group remains relevant and responsive to the changing needs of its members and the mathematical community.

The SIAG FME can benefit from fostering connections and collaborations with other SIAM activity groups and explore the possibility of co-organizing events or joint sessions at the Annual Meetings or other conferences. Additionally, they can create a platform for exchanging ideas and resources and build a network of contacts for future collaborations.

One of the ways the SIAG FME can increase its visibility and promote its activities is by giving plenary talks at the Annual Meetings.

SIFIN is an important platform for disseminating research and promoting the group's mission. The SIAM can continue to support the editorial team of SIFIN to ensure that the journal maintains its high standards of quality and relevance. The SIAG FME will continue encouraging its members to submit their research to SIFIN.

Development of corporate relations for sponsorship.

Help with marketing the SIAG FME to students by reaching out to senior undergraduate students and promoting the group's activities and benefits to this audience.

Help SIAG FME in reaching out to non-academic institutions and companies, such as banks, investment firms, regulatory bodies, and AI and software companies, that will increase the group's visibility and relevance to the wider mathematical finance community.

*9) How can the activity group help SIAM in its general role of promoting financial mathematics and engineering?*

The SIAG FME has contributed to SIAM's general goals by:

- promoting the use of mathematical models and quantitative methods in finance and enhancing the visibility of research done by SIAM members to this wide audience.
- encouraging SIAM membership and SIAM meetings to a broader audience, including researchers and students involved in mathematical finance, as well as industry professionals and finance/business school academics.
- promoting SIFIN as the leading journal in financial mathematics and engineering, and SIAM in general as a leading academic publishing house.
- establishing the importance of SIAM as a serious player and partner for dialogue with industry, governmental and regulatory bodies in issues related to the use of mathematical models in supervisory risk management, trading, finance, and policy making.

This SIAG requests that the SIAM Council and Board of Trustees renew its charter for a two-year operating period beginning January 1, 2024.

Signed,  
Igor Cialenco, SIAG/FME Chair  
May 2, 2023