

SIAM Activity Group Analysis of Partial Differential Equations Charter Renewal Application

This CHARTER RENEWAL APPLICATION applies to the SIAM Activity Group on Analysis of Partial Differential Equations. The SIAM Activity Group (or SIAG/APDE) to which this renewal applies was originally formed under the aegis of SIAM on March 26, 2003 by the SIAM Council and December 7, 2002 by the SIAM Board of Trustees with its initial operating period beginning April 1, 2003 and ending December 31, 2004. Its charter has been renewed by the Council and Board 6 times thereafter.

This SIAG has 748 members, including 433 student members (58%), as of December 31, 2015.

According to its Rules of Procedure, the objective(s) of the SIAG are:

It is the purpose of the SIAM Activity Group on Analysis of PDE to foster activity in the analysis of partial differential equations (PDE) and to enhance communication between analysts, computational scientists and the broad PDE community. Its goals are:

- To provide a forum where researchers in the area, theoretical and applied, can meet;
- To be an intellectual home for researchers in the analysis of PDE;
- To increase conference activity in PDE;
- To enhance connections between the applications and analysis communities. In particular, to foster interdisciplinary research that stems from analysis of PDE.

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

The SIAG on APDE will undertake a number of activities, including:

1. Organize a biennial SIAM Conference on Analysis of PDE. Because of connections between PDE and the topics of many of the other SIAGs, the SIAG/APDE will also solicit opportunities to run joint meetings with other SIAGs and with other periodic SIAM meetings (for example, Materials Science, Nonlinear Waves and Coherent Structures, and Computational Science and Engineering). The chair of the conference organizing committee shall be either the program director or the chairperson of the SIAG or their designee. The organizing committee must be approved by the VP for Programs at least 16 months before the conference.
2. Disseminate information. The SIAG will maintain a website to facilitate the exchange of information (conferences, summer schools, job announcements) among its members and other interested parties.
3. Award the SIAG Analysis of PDE Prize, established in 2005, to the author(s) of the most outstanding paper, as determined by the Prize Selection Committee, on a topic in Partial

Differential Equations published in English in a peer-reviewed journal bearing a publication date within the four calendar years preceding the year of the award.

4. Organize minisymposia at the SIAM Annual Meeting in years where there is no SIAG conference.
5. At least once every five years either organize a track of at least six minisymposia at the SIAM Annual Meeting or have an activity group meeting held jointly with the annual meeting. The VP for Programs and the VP at Large will coordinate the scheduling with the SIAG chair.
6. 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.

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

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: Helena Nussenzveig Lopes

Vice Chair: Dejan Slepcev

Program Director: Lia Bronsard

Secretary: Becca Thomases

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?

One of the specific missions of the SIAG is to extend its interdisciplinary efforts and increase overall visibility of the PDE community. Within this context the SIAG/APDE continues to grow and broaden its scope and to interact with a wider community of applied scientists. The variety of topics addressed in the 114 minisymposium sessions held at the SIAM Conference on Analysis of PDE in December 2015 is clear evidence of this. The minisymposia covered highly active areas of applied analysis such as Fluid mechanics and geophysical dynamics, Conservation laws, Kinetic theory, Nonlinear waves, Optimal control, Elasticity, Dispersive equations, Geometric PDEs, Stochastic PDE, Financial math, Image processing, Game theory, Numerical analysis and computations, Variational methods and applications in material sciences and Crowd

dynamics. There were two minitutorials, reflecting hot topics in PDE, one on PDEs and Mean Field Games, delivered by Pierre Cardaliaguet (Univ. Paris-Dauphine), and the other on Simulating Stochastic Systems, delivered by Jonathan Weare (Univ. Chicago). There were 9 plenary lectures, spanning some of the most active topics in the field, including the prize lecture *Slow Modulation and Large-time Dynamics Near Periodic Waves* delivered by Miguel Rodrigues (Univ. Rennes, France). Overall, the conference was a huge success.

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?

SIAG/APDE has achieved membership numbers in the middle-to-upper range of SIAM activity groups, comparable to SIAG groups LA, LS, DMA and SC, with a significant student membership percentage. There was a slight decline in student membership recently, but this has been corrected and student membership is growing again. Its 748 members, of which 433 (57.9%) are students, represent a vibrant group with strong participation in, and commitment to, planned activities. There is a healthy distribution of membership both with respect to gender and geography. In particular, outside US membership has been growing, exhibiting increased international visibility and interest in this activity group. See the charts at the end of this document.

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. The SIAG APDE organizes the biennial conference on Analysis of Partial Differential Equations.

This list of conferences may be found at: <http://www.siam.org/activity/pde/archive.php>

The 2015 SIAM Conference on Analysis of Partial Differential Equations, held in Scottsdale, Arizona, had 442 attendees, the largest of this series of conferences to date.

One of the main activities of the SIAG/APDE is to run the biennial conference on Analysis of Partial Differential Equations. By now a traditional meeting, it is regarded as one of the highest quality conferences in the field of PDE. This conference is organized so that there is a broad spectrum, including topics from abstract mathematical analysis to applications in a wide variety of fields, while maintaining a strict quality control on the scientific level, which is outstanding.

The 2016 Gene Golub Summer School will take place at Drexel University, immediately preceding SIAM Conference on Nonlinear Waves and Coherent Structures. This school received strong support from the SIAG/APDE community, among whom many have

interests overlapping the theme of the school, *Stochastic Differential Equations and Wave Propagation*.

The SIAG/APDE has a track at the 2016 SIAM Annual Meeting, with one of the plenary lectures delivered by Lia Bronsard, from the SIAG/APDE, and five minisymposium sessions organized by members of this activity group.

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?

Because of the number of Activity Groups, the current guidelines are that an Activity Group should organize a track about every seven (7) Annual Meetings or meet jointly with the Annual Meeting within a seven (7) meeting period.

The SIAG/APDE has a track at the 2016 SIAM Annual Meeting, where there will be one plenary lecture from the APDE community, delivered by Lia Bronsard, and five minisymposium sessions organized by members of this activity group. The minisymposia organized by the SIAG/APDE at the 2016 SIAM Annual Meeting are:

2016 AN16 MS075 Recent Progress on Inviscid Fluid Dynamics-Part I of II 23196

2016 AN16 MS094 Recent Progress on Inviscid Fluid Dynamics-Part II of II 23197

2016 AN16 MS099 Conservation Laws with Singular Shocks: Analytical, Numerical and Experimental Studies-Part I of II 23326

2016 AN16 MS115 Conservation Laws with Singular Shocks: Analytical, Numerical and Experimental Studies - Part II of II 23327

2016 AN16 MS140 Pattern Formation in Singularly Perturbed Variational Problems 23531.

In 2015 the International Conference on Industrial and Applied Mathematics was held in Beijing, in lieu of the SIAM Annual Meeting. Information on the activities in which (many) members of the SIAG/APDE took part has not been made available.

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 activity group maintains a website at

<http://siags.siam.org/siagapde/index.html>

There is a mailing list to which members regularly post and receive information about conferences, summer schools, jobs and post-docs. The mailing list has quickly become an essential tool for the community.

The SIAG/APDE awards the SIAM Activity Group on Analysis of Partial Differential Equations Prize. The prize was established in 2005 and it is awarded to the author(s) of the most outstanding paper, as determined by the prize committee, on a topic in partial differential equations. The SIAG/APDE Prize is awarded at the biennial Conference on Analysis of PDE. It was awarded in 2015 to Matthew A. Johnson (Univ. Kansas), Pascal Noble (Inst. Math. Toulouse), Miguel Rodrigues (Univ. Rennes) and Kevin Zumbrun (Indiana Univ.) for their paper, "*Behavior of Periodic Solutions of Viscous Conservation Laws Under Localized and Nonlocalized Perturbations*," published in *Inventiones Mathematicae*, Volume 197, Issue 1, 2014. This paper gives a comprehensive rigorous answer to the stability and asymptotic behavior of periodic traveling wave solutions for a large class of dissipative systems including reaction-diffusion models and general systems of conservation or balance laws.

The 2015 Prize Committee was chaired by Catherine Sulem (Univ. Toronto), with Irene Gamba (Univ. Texas, Austin), Eitan Tadmor (Univ. Maryland, College Park), Athanasios Tzavaras (Univ. Crete) and Michael Weinstein (Columbia Univ.) serving as members.

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

The next SIAM Conference on Analysis of Partial Differential Equations is being planned for December 2017. Precise dates and location are still being discussed.

The SIAG/APDE has submitted a proposal to have a Junior Prize in Analysis of Partial Differential Equations. This junior prize was discussed at the Business Meeting held in December 2015 during the Conference on Analysis of PDE; it is an award for best thesis and designed to promote and encourage junior participation in the SIAG.

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

Most of the SIAG/APDE community consists of academic members (85%). Thus SIAM can help to promote this activity group in non-academic institutions, such as industry and research labs. SIAM could also help establishing liaisons with international organizations with whom SIAM maintains reciprocal agreements. Many of these organizations have members with interests in line with those of the SIAG/APDE and, perhaps, a SIAG/APDE membership could be added as a free perk of Reciprocal Membership.

9. How can the activity group help SIAM in its general role of promoting applied mathematics and computational science?

The SIAG/APDE contributes an analytical vision to SIAM that focuses on the interactions of rigorous analysis with modeling and scientific computing. It comprises a broad group of active research scientists, 85% of which in academia, working towards understanding fundamental analytical issues for nonlinear models in the natural and social sciences. Applied mathematics relies on the synergy between rigorous analysis, computations and modeling and analysis of PDE is one of the classical areas where such synergy unfolds. Thus the SIAG/APDE community naturally plays a pivotal role in the development of interdisciplinary research and fruitful collaborations among applied mathematicians.

This SIAG requests that the SIAM Council and Board of Trustees renew its charter for a two year operating period beginning January 1, 2017.

Signed

Helena Nussenzveig Lopes, Chair

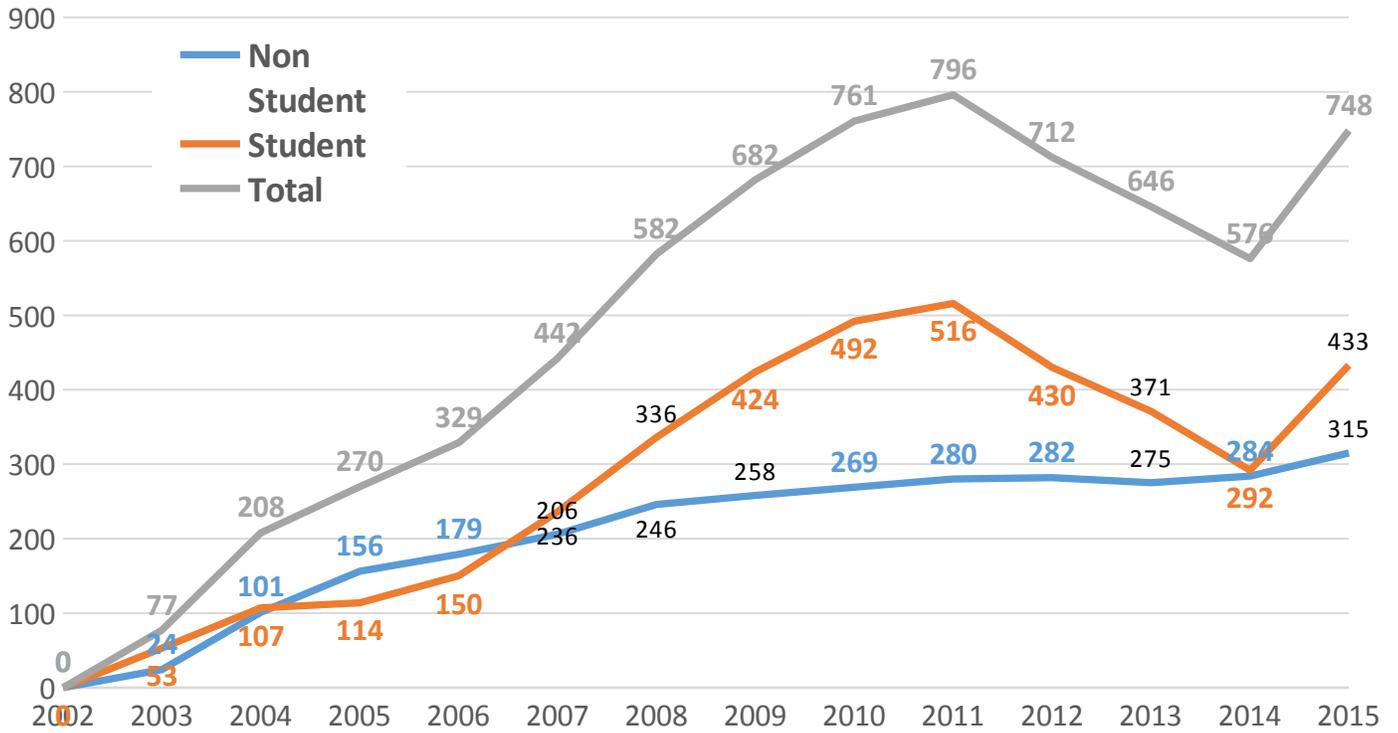
On behalf of the SIAG/APDE officers:

Dejan Slepcev (Vice-Chair), Lia Bronsard (Program Director), Becca Thomases (Secretary).

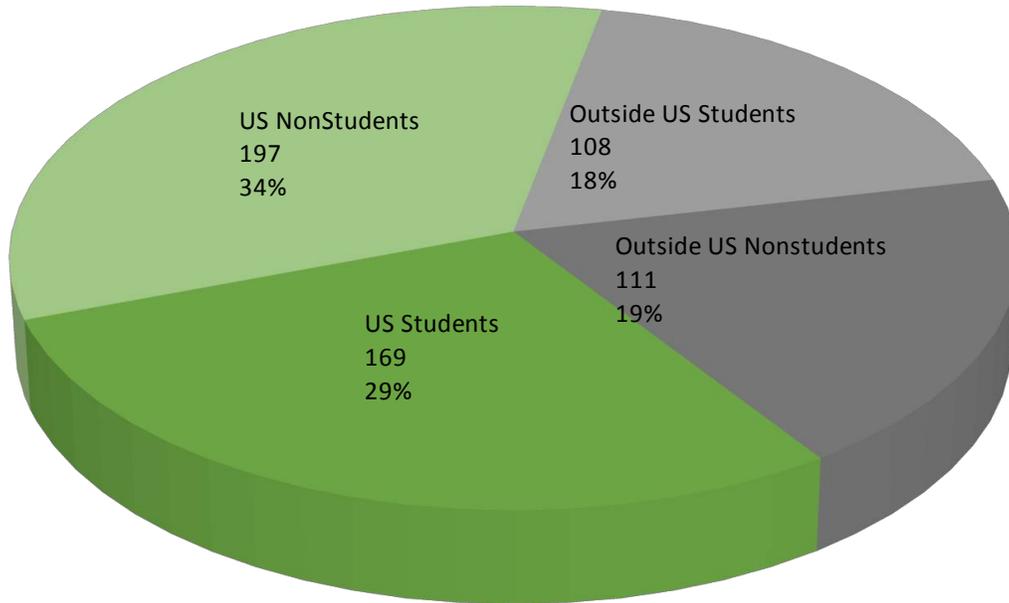
May 2016

Acknowledgments; We would like to thank Nancy Snell, Linda Thiel and Susan Whitehouse for the contributions to this application, specifically the data graphics that were available to us and the records of our activities available to us for the purpose of this application.

SIAG/APDE Membership History

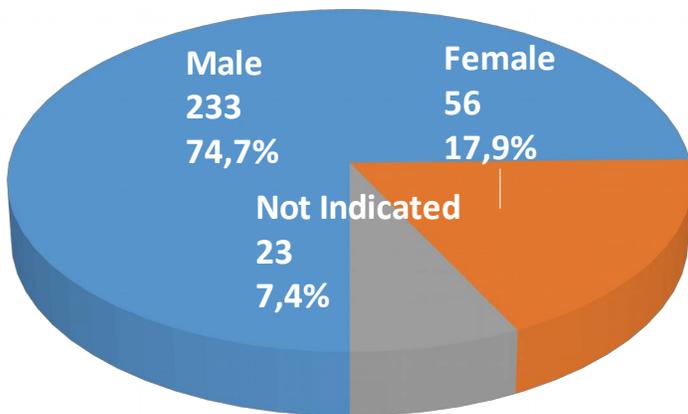


SIAG/APDE Members By Geography



SIAG/APDE Membership by Gender

Non Students



Students

