

## **SIAM Activity Group on Nonlinear Waves and Coherent Structures Charter Renewal Application**

This CHARTER RENEWAL APPLICATION applies to the SIAM Activity Group on Nonlinear Waves and Coherent Structures. The SIAG/NWCS was originally formed under the aegis of SIAM on December 7, 2002 by the SIAM Board of Trustees and on March 26, 2003 by the SIAM Council with its initial operating period beginning January 1, 2003 and ending December 31, 2005. Its charter has been renewed by the Council and Board five times thereafter.

Statistics:

- This SIAG had 301 members, including 141 student members and 160 non-student members as of 12/31/2017
- Of the non-students there are 20 female and 135 male members
- Of the non-students there are 101 domestic and 59 international members of this SIAG

According to its Rules of Procedure, the purpose of the SIAG is to foster activity in the area of Nonlinear Waves and Coherent Structures. Its goals are:

- To foster collaborations among applied mathematicians, physicists, fluid dynamicists, engineers, biologists, and economists in those areas of research related to the theory, development, and use of nonlinear waves and coherent structures.
- To promote and facilitate Nonlinear Waves and Coherent Structures as an academic discipline.

The SIAG on NWCS will promote and facilitate research in the area through a variety of activities, including:

1. Organize a biennial SIAM Conference on NWCS. The SIAG also will consider dovetailing specialized workshops and conferences with the SIAM Annual meeting. In particular, it is planned to have the biennial meeting alternate loosely between university-style meetings, ones dovetailed with SIAM Annual Meetings, and joint meetings with other SIAGs.
2. Broker partnerships between academia, industry, and government laboratories. The SIAG will seek to facilitate the establishment of academic programs in NWCS to foster its development as an academic discipline. The SIAG also will facilitate the placement of undergraduate and graduate students in internships in industry and government laboratories.

3. The SIAG will work with other professional societies to promote NWCS. 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 NWCS through various outreach activities.

Other activities may include:

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 SIAM 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.

7. Award of the biennial Martin Kruskal Lecture Prize, established in 2012.

8. Award of the biennial T. Brooke Benjamin Prize, established in 2016.

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.*

Chair: Peter Miller

Vice Chair: Douglas Wright

Program Director: Todd Kapitula

Secretary: Katie Oliveras

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 study of nonlinear waves and coherent structures, as a sub-discipline of applied mathematics, continues to be a very strong and active area with a wide range of relevant applications and a deepening basis in mathematical theory. Some evidence for the health of the field lies in the fact that in addition to the biennial SIAM Conference on Nonlinear Waves and Coherent Structures there are several other regular field-wide conferences of international

stature, as well as frequent special sessions at smaller meetings such as AMS sectionals. Some newer areas of interest to be featured at the 2018 SIAM NWCS conference (Mat Johnson and Todd Kapitula, co-chairs) include nonlinear waves in traffic flow relevant for the development of autonomous vehicles, as well as the use of partial differential equations as models for social complex systems. Traditional areas of interest such as stability analysis of nonlinear waves, integrable systems and soliton theory, and applications such as water waves, granular media, and nonlinear optics remain of fundamental importance to the activity group.

*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 in Nonlinear Waves and Coherent Structures is healthy in terms of membership. Although it is one of the smallest of the SIAGs by membership, a recent trend is an increase in the number of student members (from 100 to 141 between 2015 and 2017). This seems to be a correction because there was a rather sharp dip in student membership around 2013-2015, while non-student membership has continued to remain fairly steady since the earliest years of the existence of the SIAG. The SIAG attempts to keep up with changes in the field primarily through soliciting plenary lectures or minitutorials at the biennial meeting that relate to new or emergent areas of interest. Another activity that aims to enhance the interest in nonlinear waves for young researchers and/or students is the organization of a "hot topics" session at the biennial meeting. Although the fraction of SIAG NWCS members from industry or government labs is low compared to other SIAGs, a deliberate attempt is made to have representation from these sectors in prominent roles of organization and/or presentation at the biennial meeting.

*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 NWCS organizes the biennial conference on Nonlinear Waves and Coherent Structures. This list of conferences may be found at:*

<http://www.siam.org/meetings/archives.php#nonlinearwaves>.

The most recent conference sponsored by the SIAG was the SIAM Meeting on Nonlinear Waves and Coherent Structures held in Philadelphia, PA, in 2016. The co-chairs of the organizing committee were David Ambrose (Drexel) and Annalisa Calini (Charleston). The meeting had 253 registered participants, which is close to the historical median, although significantly smaller than the preceding meeting held in Cambridge, UK. The latter meeting had 416 registered participants, but this appears to be a statistical outlier. Many aspects of the 2016 Philadelphia meeting were very positive, including a strong scientific program and an attractive Gene Golub summer school that was held at Drexel University just before the conference. Feedback from conference participants suggests that some feel that the meeting could be better value for the money in terms of expense of registration fees and housing costs. Another aspect of the Philadelphia meeting that was somewhat disappointing is that very few if any of the members of the organizing committee actually attended the meeting.

*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? (Guidelines are that each activity group should organize a track about every 7 Annual Meetings or meet jointly with the Annual Meeting within a 7 meetings period.)*

The SIAG officers decided not to organize a track at the SIAM Annual Meeting this year because the timing and location were too close to those of the SIAG's own biennial meeting, to be held in Anaheim, CA, in June 2018. The last time the SIAG ran a track at a SIAM Annual Meeting appears to have been in 2013, so although it was not necessary this time, we are due in the next two years. The next leadership of the SIAG may wish to try to avoid a time/location clash with the Annual Meeting or organize a track in an off-year for the SIAG biennial meeting.

*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 maintains an email mailing list, which is co-moderated by SIAG Secretary Katie Oliveras and SIAG Chair Peter Miller. This cycle, the SIAG introduced for the first time a newsletter edited by SIAG Secretary Katie Oliveras. The first issue of the newsletter was distributed to the membership of the SIAG via the mailing list. The current leadership would be very happy to assist in transferring the templates and other materials for preparing the newsletter to the next set of officers. The SIAG regularly awards the Martin J. Kruskal Prize/Lecture as well as (since 2016) the T. Brooke Benjamin prize, which is specifically targeted at honoring the achievements of mid-career researchers.

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

Of course the biggest job of the SIAG is the sponsorship of the biennial SIAM Conference on Nonlinear Waves and Coherent Structures, and in the next period this will concern the 2020 meeting. The current SIAG officers have received a few official proposals from members regarding possible locations for the 2020 meeting, and these will be discussed at the business meeting to be held in June 2018 as part of the upcoming NWCS conference in Anaheim. It will be important to select the next location carefully to reflect the interests of the broader SIAG membership in terms of physical location and venue type (e.g., hotel or university) while balancing them with the utility and advantages of SIAM staff expertise, which favors urban locations and hotel venues. It may be appropriate to consider a location for the conference in Latin America for the first time. The SIAG also wishes to continue with the production of a regularly-published newsletter, which may be enhanced in the future with new features such as indices of relevant papers posted to the preprint arXiv. Other ideas include the use of social media such as a Twitter feed to update and modernize the manner in which the SIAG communicates with its members and/or advertises its services to potential members. Another idea that was also proposed previously would be the initiation of a SIAG blog, which could possibly absorb and enhance the function of the newsletter in the future.

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

One idea might be if SIAM could sponsor a new SIAM journal on Nonlinear Waves and Coherent Structures. Such a journal with the SIAM masthead could help to further promote the scientific activity of the SIAG, which could in turn increase membership. There are other venues in the SIAM journal system for different types of papers written by SIAG members (e.g., SIAM Journal on Mathematical Analysis for more mathematically-oriented papers on partial differential equation models, or SIAM Journal on Scientific Computing for numerical simulations of nonlinear waves) but there is no coherent publication home for the SIAG within SIAM.

*9. How can the activity group help SIAM in its general role of promoting nonlinear waves and coherent structures?*

Members of the SIAG could help SIAM promote the general area of nonlinear waves research by writing and/or proposing articles for SIAM News, or in the case of longer and more detailed articles, SIAM Review. Otherwise, the SIAG could maintain its efforts to make the biennial conference and other SIAG activities relevant to student members so that they remain active in SIAM when they become professionals.

This SIAG requests that the SIAM Council and Board of Trustees renew its charter for a two year operating period beginning January 1, 2019.

Signed and dated by the current SIAG Chair

A handwritten signature in blue ink that reads "Pete D. Miller". The signature is written in a cursive style with a large initial "P" and a long, sweeping underline.

June 1, 2018