

Geometric Design Charter Renewal

This CHARTER RENEWAL applies to the SIAM Activity Group on Geometric Design. The SIAM Activity Group (or SIAG) to which this renewal applies was originally formed under the aegis of SIAM on 1989 by the SIAM Council and by the SIAM Board of Trustees with its initial operating period beginning July 1, 1989 and ending December 31, 1992. Its charter has been renewed by the Council and Board 9 times thereafter. This SIAG has 151 members, including 29 student members, as of December, 31, 2013.

According to its Rules of Procedure, the objective(s) of the SIAM Activity Group on Geometric Design is to provide an environment for interaction between researchers and practitioners in the subjects of curve and surface design, solid modeling and manufacturing, volumetric representations, computer graphics, supercomputing and graphics, and related topics.

Its purposed functions were:

1. The SIAG will organize activities, including conferences and publications, to promote the interaction of practitioners and researchers and to keep the SIAM membership up to date on trends in geometric design.
2. The SIAG shall not present awards or otherwise recognize scientific achievement, professional service, or the like without prior approval by both the SIAM Major Awards Committee and the SIAM Council of the award criteria, the method of selection of recipient(s), the nature of the award, and all other aspects, if any, of each such award must have the prior approval of the SIAM Board of Trustees.

Other activities can include:

3. Organize minisymposia at the SIAM Annual Meeting in years where there is no SIAG conference.
4. 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.
5. Organize a biennial SIAM Conference on Geometric Design. The SIAG will consider dovetailing specialized workshops and conferences with the SIAM Annual meeting or other SIAG conferences. 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.
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. Maintain a website for the activity group.

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: Elaine Cohen

Vice-Chair: Tim Strotman

Secretary: Geraldine Morin

Program Director: Jan Vandenbrande

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 Geometric Design industry in the US and the European Union remains unsteady with consolidations continuing. Funding for geometric design and computer graphics in the US has not increased, although the EU continues to fund GD research in large grants crossing industry, academia, and research institutes as part of a focus on the new area of isogeometric design and analysis. The activity in Asia in Geometric Design is also along multiple fronts, including geometric computation and modeling, using GPUs, and reconstruction for isogeometric analysis.

While there are still many important research problems and issues in core areas, there has been increasing interest in design and representations for isogeometric analysis and using isogeometric analysis as a means of optimizing geometric design of products, as well as several evolving areas that we list below.

There has been increasing interest and research among the attendees of the SIAG-GD conference in these new areas, with a significant increase in percentage of presented papers related to these topics, particularly parameterization and representations. Research into geometric design, modeling, and computation is relevant in several new areas, as below, and the efforts should be led by researchers from our community.

- Significant results in reconstructing and analyzing surfaces and using GPUs are continuing. GPU algorithms have the potential to speed various design processes in the future as well.
- Recently also displays have evolved. Specialized displays have moved to commonplace application. The development of these displays followed the advances of (and access to) the GPUs, and leads to both new applications for 3D models, and therefore new challenges for the geometric design community.
- New surface reconstruction methodologies designed to be used with multiple sensor technologies.
- Designing and representing objects that can be fabricated with the new additive manufacturing technologies, ("3D printing") including complex material specification.
- Composite modeling and manufacturing in conjunction with geometry, analysis and optimization is a newly evolving area, of particular interest to the aerospace and automobile industries.

Thus, the focus areas are being enriched as some of the more traditional ones are becoming more mature. Diversification and collaboration with domain researchers in affiliated areas will broaden the mix. This was already seen at the last SIAG-GD meeting in November 2013.

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?

As per SIAM's numbers, the number of members has decreased. As far as we can tell, this has been caused by a decrease in the number of student members. SIAG members who are faculty and industrial mentors to students should be encouraging the students to join SIAM and the SIAG-GD. This is especially relevant when we take note of the potential for students to have interests in several SIAGS.

In addition, consolidation in the industries that create CAD products, and more recently, turmoil in important industries that are advanced users of and researchers in Geometric Design have worked against the SIAG. In particular research in industry has declined. We look forward to some stabilization in those industries and to developing ties with the newer industries that are interested and researching the current topics of the SIAG-GD and those whose geometric representational and computational needs are not yet well served.

It is our goal to introduce several of these newly evolving topics to the community at the next biennial meeting in 2015 through invited presentations and minisymposia. In the cases for which there are already SIAM SIAGs whose members we can enlist, we will do so.

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 Geometric Design organizes the biennial conference on Geometric Design. This list of conferences may be found at: <http://www.siam.org/meeting/archive.php#GD>. The SIAM Conference on Geometric Design in 2013 had 149 attendees.

The SIAM Conference on Geometric Design was held in Orlando, FL on October 24-27, 2011 and had 164 attendees including 110 paid non students and 30 paid students attending. Our bi-annual conferences SIAM-GD/SPM 2011, SIAM-GD/SPM 2013, and the SPM meeting in even years are the main conferences (SPM=solid and physical modeling). We successfully joined forces with the ACM conference Solid and Physical Modeling in 2009 and continued this cooperation until today. This stabilized the attendance level from 2007 to 2009, increased the attendance level in 2011, with a slight decrease in 2013.

There has been speculation that the decrease observed in 2014 was in part caused by the lack of nearby researchers in the location city. While there is some CAD industry in that area, participation at the last meeting was small. By holding the meeting in an area with vibrant research, the SIAG hopes to have increased local attendance and higher student participation.

The conference was marked with several successful minisymposia directed at presenting research from the burgeoning area of representing and designing for isogeometric analysis, and new requisite methodologies.

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?

GD: Track at AN12.

Tor Dokken, Jorg Peters, and Tom Peters organized a track at SIAM AM 2012 consisting of four mini-symposia and one invited speaker.

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/GD runs the website which until now was hosted by university of Oslo. We are moving to a website hosted by SIAM so we can update it more readily. The SIAG secretary is in charge of this effort. We have just obtained the URL: <http://siags.siam.org/siaggd/index.php> We would like to run it so that we can publish relevant activities from various members, including any awards or plenary invited presentations on activities related to SIAG-GD.

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

The SIAM GD/SPM 2015 conference is in the planning phase for a probable East coast location. It is hoped that that makes European participation more possible, and still does not endanger Asian participation. The officers have been discussing and will further detail discussions with the conference chairs about asking closely related SIAGs to hold minisymposia that will encourage our members to work more collaboratively across areas. Also we will bring invited speakers from newly expanding research areas.

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

Host a permanent website for this SIAG? This is important b/c we want to show that the SIAG-GD is an active community. See some ideas in #6 above.

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

Keeping the members informed about SIAM activities and participation in SIAM organization. We can use the website to do this on a regular basis, so it will be available to nonmembers, and, by facilitating the emerging industrial visitors program. We hope to encourage faculty members and others who mentor students that they should have their students join the SIAG and come to the meetings.

This SIAG requests that the SIAM Council and Board of Trustees renew its charter for a two year operating period beginning January 1, 2015.

Signed

Elaine Cohen, Geometric Design SIAG Chair

May 28, 2014