SIAM Activity Group Geometric Design
Renewal Application

This CHARTER RENEWAL APPLICATION applies to the SIAM Activity Group on Geometric Design. The SIAM Activity Group (SIAG/GD) to which this renewal applies was originally formed under the aegis of SIAM in 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 twelve times thereafter.

This SIAG has 139 members, including 46 student members and 93 non-student members, as of December, 31, 2019. Among student members there were 19 male and 18 female members (with 8 not indicated). Among non-student members there were 69 male and 14 female members (with 10 not indicated or preferring not to disclose).

According to its rules of procedure, the objective of the SIAG is to provide an environment for interaction between researchers and practitioners in the subjects of computer aided geometric design, curve and surface design, solid modeling and manufacturing, volumetric representations, computer graphics, supercomputing and graphics, and related topics.

Its purposed functions:

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 may (with the approval of the SIAM Major Awards Committee) make awards to researchers and practitioners in the field it serves.

Other activities may 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.

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.

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

Chair: Rida T. Farouki
Vice Chair: Timothy Strotman
Program Director: Carlotta Giannelli
Secretary: Tom Cashman

1. 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?

   Geometrical algorithms and representations are fundamental to a broad array of scientific and engineering applications, including (1) the design, analysis, and fabrication of components and assemblies for the automotive and aerospace industries; (2) construction and interpretation of volumetric models for medical diagnoses, surgical planning, and design of prosthetics; (3) the use of computer animation for movie making and flight simulation; and (4) novel approaches to architectural design and planning. These applications continue to provide fertile grounds for developing new research directions. This is exemplified by new developments based on emerging fields that involve tighter cross-disciplinary integration, such as precision geometry based automated fabrication processes (e.g., CNC machining and 3D printing), and isogeometric analysis, which aims to bypass traditional mesh-based approaches to solving partial differential equations over complicated domains.

2. 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 membership has remained relatively stable over the past few review cycles (the current membership numbers may not reflect the outcome of a recent drive to recruit new student members). The membership is diverse and incorporates a high proportion of industry representatives, which is indicative of the real-world relevance of the discipline. Among the academic members, there is a good balance of representatives from mathematics, engineering, and computer science departments. As noted in #1 above, the SIAG has broad-ranging interests that offer bridges to other sub-disciplines within the SIAM community.

3. 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.

   The 2017 SIAM Conference on Industrial and Applied Geometry was co-located with the 2017 SIAM Annual meeting in Pittsburgh, PA (June 10-12, 2017). The GD conference registration was relatively low, possibly due to the Summer schedule (the conference usually has a Fall schedule).

   The 2019 SIAM Conference on Computational Geometric Design was organized as part of the Geometry Summit held in Vancouver, BC, Canada (June 17-21, 2019). The total attendance at the Geometry Summit was approximately 200.

4. 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 2017 SIAM Conference on Industrial and Applied Geometry was co-located with the 2017 SIAM Annual Meeting.

   A minisymposium on Automated Finite Element Analysis was organized at the 2018 SIAM Annual Meeting in Portland, OR (July 19-23, 2018).

5. 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 a web page, located here:
   http://wiki.siam.org/siag-gd/index.php/Main_Page

   An Early Career Prize has been implemented. The Nominating Committee for this prize has been constituted and has begun soliciting nominations.

   We canvassed SIAG membership and identified volunteers to test and contribute to the new SIAM Engage web portal. Approximately 20 members have volunteered to participate in this effort.

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

   The 2021 SIAM Conference on Computational Geometric Design will co-locate with the 2021 ACM Symposium on Solid and Physical Modeling. The conference will take place at the University of California Davis campus between September 27th and 29th, 2021. GD submitted a detailed plan for organizing this conference to Richard Moore, SIAM Director of Programs and Services, for review. Additionally, we made a preliminary reservation of the UC Davis

Conference Center. We anticipate that the California location and a return to a fall conference schedule will attract a strong attendance in late 2021.

We hope to complement the Early Career Prize with a prize for outstanding career contributions by senior researchers. We believe we can accomplish this by placing the John A. Gregory Memorial Award (which currently has no institutional affiliation) under SIAM auspices.

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

   The success of GD 21 relies on SIAM's financial management and promoting the conference to a responsive audience. We are hopeful that the SIAM Engage portal increases communication and collaboration among the SIAG membership. Increases in membership engagement is a great tool for retaining old members and recruiting new ones.

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

   As noted in the response to item #1, the activities of our SIAG are inherently cross-disciplinary in nature and can help form links between different SIAGs. Geometrical models play a key role in analyzing physical behavior (mechanical stress, fluid flow, heat transfer, etc.) over 3-dimensional domains, in multidisciplinary design optimization, automated manufacturing and inspection, and similar applications of interest to other SIAGs. A brief synopsis may be found in the following article:

   https://sinews.siam.org/Details-Page/geometric-design-new-trends-and-challenges

   SIAM can help encourage such cross-disciplinary research efforts by promoting exploratory workshops co-sponsored by the appropriate SIAGs.

This SIAG requests that the SIAM Council and Board of Trustees renew its charter for a two-year operating period beginning January 1, 2021.

signed,

Rida A.M.T. Farouki

Rida T. Farouki, SIAG/GD Chair

May 13, 2020