CHARTER RENEWAL APPLICATION

This CHARTER RENEWAL APPLICATION applies to the SIAM Activity Group on Geometric Design (SIAG/GD). The SIAG/GD was originally formed under the aegis of SIAM in 1989 by the SIAM Council and the SIAM Board of Trustees. Its initial operating period began July 1, 1989 and ended December 31, 1992. Its charter has been renewed by the SIAM Council and SIAM Board of Trustees six times thereafter. The SIAG/GD has 177 members as of December 31, 2007.

According to its Rules of Procedure, the objective(s) of the SIAG/GD is to provide an environment for interaction between researchers and practitioners in the subjects of curve and surface design, solid modeling and manufacturing, computer graphics, supercomputing and graphics, and related topics.

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

Its proposed functions were to undertake a number of 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.

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The SIAG/GD 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. 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 three years?

The field of geometric design has continued to evolve in the last few years, just as it has over the last 30. The primary trend over that time has been the increasing breadth of research areas into which geometric design has focused. As each new area has been explored, the discoveries have been integrated with past advances, and the field as a whole has moved forward. In the early 1980s, the field was focused primarily on spline methods, both tensor products and more general splines defined over simplices. In the late 1980s, the field incorporated a great deal of classical material from algebraic geometry and even made a few advances in this area. More specifically, though, many of the algebraic geometry methods have been integrated with spline methods to form the core of modern commercial CAD software. In the 1990s, subdivision surfaces and level set methods were explored by the community. These developments have proven particularly important in the fields of animation and medical imaging. The current hot research topic is discrete differential geometry. The current vast size of computer memory and the fast speed of modern processors makes it feasible to represent curves and surfaces by sequences and clouds of discrete points. Mathematically, doing so successfully means recovering an ability to perform all of the traditional and desired differential geometric calculations. Much recent effort has been invested in this area in just the last couple of years, with the result that, for many things, discrete representations of smooth surfaces can now be used as effective replacements for them. Whether this effort will ultimately succeed is still very much unknown, but it won't be for lack of appropriate analytic and mathematical tools, many of which have been developed by members of our SIAG and communicated by and to our members.

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?

Although the SIAG lost a considerable number of members during the four years from 1999 to 2002, with membership falling every year from 200 in 1999 to 129 in 2002, that trend has since reversed itself, and the membership is once again growing, showing an increase every single year since. Moreover, the largest increase occurred during 2007, when membership jumped from 149 at the end of 2006 to 177 at the end of

2007. In addition, the percentage of members working in industry in the SIAG (23%) is considerably higher than in SIAM overall (12%).

The primary mechanism the SIAG uses to keep abreast of changes in the field is its biennial conference. Since 1987, this conference has been held in November of odd numbered years. In recent years, the conference has lasted four days, with a one day or one half day minitutorial or short course held on the Sunday preceding the conference. The conferences have followed the standard SIAM format, with invited, plenary talks and parallel minisymposium and contributed papers sessions. At the request of SIAM, the most recent conference in San Antonio featured a special Forward Looking Session. This special minisymposium consisted of six industrial speakers, each of whom challenged the membership with a currently unsolved, open problem of practical interest. These problems will be posted soon at the SIAG website. The plan is solicit talks from individuals who have made progress on these problems at the next conference in 2009 while simultaneously adding new, unsolved problems to the list.

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 has directly sponsored the biennial conference series "SIAM Conference in Geometric Design and Computing", the latest two of which were held in San Antonio, TX (11/07) and Phoenix, AZ (11/05).

The SIAG also co-sponsored the workshop Computational Methods for Algebraic Spline Surfaces II (COMPASS II 2005), Centre of Mathematics for Applications at the University, Oslo, Norway, with approximately 30 participants. This was a very successful workshop with proceedings to be published by SPRINGER.

During even numbered years in which the SIAG does not hold its conference, the French and Norwegian "Curves and Surfaces" conferences are held (in Norway in leap years and in France in years in which the Winter Olympics are held). Many of the SIAG's members are active participants in these conferences, with the French conferences frequently having 300-400 attendees.

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 of minisymposia at an annual meeting?

The SIAG did not organize any minisymposia at AN06 or AN07. However, a call for volunteers to organize a minisymposium at AN08 issued at GD07 was answered by Leif Kobbelt and Konrad Polthier. Their minisymposium features four speakers who will summarize the current state of geometric modeling for the attendees in San Diego.

5. Please indicate other activities sponsored by the activity group, to include newsletters, prizes and websites. Have each of these been active and successful?

A SIAM News article summarizing the Forward Looking Session at the San Antonio conference is imminent. This article will also announce the website at which the problems posed in this session can be found.

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

The biggest activity planned is a joint conference with the ACM Solid Modeling Association, tentatively slated for September, 2009. This conference, which we hope will draw upwards of 250 attendees, will feature the best that the SIAM Geometric Design conferences and the ACM Solid and Physical Modeling Symposia have offered in the past. In particular, the conference will have a couple of SIAM-style minitutorials on the Sunday preceding, another Forward Looking session similar to the one held in San Antonio, plenary invited speakers, minisymposia, and contributed paper sessions. In addition, ACM will be publishing proceedings, available at the time of the conference, which will consist of peer-reviewed

"proceedings papers" which will be solicited and reviewed in advance and presented in plenary sessions at the conference. With SIAM's help, the planning for this conference is already well under way.

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

SIAM has been and continues to be extremely helpful in terms of providing the SIAG officers with the information they need to lead the group. Indeed, with the constant turnover in SIAG officers, the continuity provided by SIAM provides huge benefit to the SIAG. Moreover, SIAM has been and continues to be extraordinarily helpful in terms of organization of our conferences.

The most important thing SIAM can do to help us over the next two years will be to provide lots of advice in terms of coordination with ACM. We're trying something not attempted by our SIAG before, and SIAM can provide lots of advice on the details of achieving success with our joint meeting.

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

The visual nature of many of the applications that arise naturally in geometric modeling mean that several members of the SIAG have developed several very visually powerful presentations that help to make clear at a glance the power of applied mathematics in the modern world. The SIAG can provide speakers, demos, online presentations, and illustrated written material which demonstrate not only the traditional applications of mathematics in engineering, manufacturing, medical imaging, and so on, but also in the entertainment and gaming industries.

This SIAG requests that the SIAM Council and Board of Trustees renew its charter for a two-year operating period beginning January 1, 2009.

Signed

Thomas A. Grandine
4/30/08