

CHARTER RENEWAL APPLICATION

This CHARTER RENEWAL APPLICATION applies to the SIAM Activity Group on Geosciences. The SIAM Activity Group (or SIAG) to which this renewal applies was originally formed under the aegis of SIAM on July 7, 1991, by the SIAM Council and July 13, 1991, by the SIAM Board of Trustees, with its initial operating period beginning January 1, 1992, and ending December 31, 1994. Its charter has been renewed by the council and board three times thereafter. This SIAG has 226 members as of May 15, 2002.

According to its Rules of Procedure, the objective of the SIAG is to provide an established forum for interdisciplinary interactions among mathematicians, engineers, chemists, physicists, and other scientists having special interests in flow in porous media and geophysics.

Its purposed functions were to organize activities, including conferences and applications, to promote the interaction of practitioners and researchers and to keep the SIAM membership up to date on trends in geosciences.

* * *

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. 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 geosciences activity group has experienced a shift in focus, with growth in some fields and decline in others. For example, when the activity group was formed, a major emphasis was on enhanced oil recovery. As the oil business has had its ups and downs, many researchers in the SIAG shifted towards environmental remediation of underground waste sites (a topic mathematically related to oil production). However, in the past few years, we have seen a rebound in petroleum research, as reservoir characterization, stochastic modeling, upscaling, geophysics and geomechanics have seen increased interest. It is important, as research topics ebb and flow, that groups such as ours, which have a collective "memory," exist and thrive.

A major topic of the activity group since its founding has been porous media. This field is enlarging to model complex flows including various coupled phenomena; e.g., transport, multiphase flows, biogeochemistry and mechanics. New computational algorithms are also being developed for these difficult problems. Many people in this area are also doing research with biological applications (bio-tissue, characterizing porous media), to go where the funding is. Another example of diversification is incorporating electro-chemical effects to characterize porous media. The activity group has also expanded to include surface water, climate and atmospheric modeling, though here we are competing with more established societies with a long history in these areas, such as AGU (American Geophysical Union) and AMS (American Meteorological Society). We have discussed holding joint meetings with AGU but have never been able to make it happen.

Numerical algorithms, parallel computation, mathematical modeling of multiscale phenomena and stochastic modeling have always been strong components of the activity group and will continue to be. Significant advances in these areas have been made over the past decade, many by members of our activity group. These include:

- * new locally conservative finite element and finite volume discretizations for unstructured meshes
- * new domain decomposition strategies for parallel computation and modeling of coupled phenomena
- * development of more complex and non-trivial upscaling to derive/check the models to be used in simulations
- * development of new coupled models for multiphysics applications
- * 4D seismic for reservoir characterization and production
- * improved stochastic models for incorporating and quantifying uncertainty

2. How is the activity group doing? Is it remaining vibrant? Is it keeping up with the changes in the field? What is the role of mathematics, industry, and interdisciplinary activity?

The activity group is doing very well. Our biennial meetings are well attended and are considered by many to be among the most vital meetings on geosciences. Many of the people involved in the activity group are at the forefront of research in the geosciences in North America, Europe and elsewhere. Thus, in many instances our members are making the changes in the field, not just keeping up with them. Our membership comes predominantly from the applied and computational mathematics community, although we have a large cross-section of members from other science and engineering disciplines. Industry is well represented in our membership and at our biennial meetings. Geosciences, by its very nature, is interdisciplinary, and we believe this is well reflected in our membership and in our meetings. A new journal, "Computational Geosciences," was founded by members of the SIAG, C.J. van Duijn and M.F. Wheeler, and the editorial board of the journal is predominantly SIAG members.

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.

We have sponsored two conferences on Computational and Mathematical Issues in the Geosciences, one in San Antonio in 1999, and one in Boulder, Colorado, in 2001. The 1999 meeting was held jointly with the SIAM Activity Group on Parallel Computing and was our largest meeting to date in terms of attendance. The 2001 meeting had a slight decrease in attendance but both meetings were very successful scientifically. The 2001 meeting may have suffered from having less publicity than the 1999 meeting. We are trying to rectify this for the 2003 meeting. Furthermore, the 2001 meeting was held at almost the same time as a similar geosciences AMS-SIAM Summer Workshop, which hurt attendance. I'm not sure why SIAM allowed this to happen.

4. Please indicate the number of minisymposia directly organized by the activity group at the last two annual meetings.

We did not organize a session at the 2001 annual meeting since we had just had a conference in June of 2001. We are organizing a two-part minisymposium for the 2002 annual meeting.

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?

We do not have our own newsletter or web site. We have, however, contributed several articles to *SIAM News*.

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

Our primary activity is our biennial meeting, the next one will be held March 17-20, 2003, in Austin, Texas. The call for papers for this meeting has already gone out, and several plenary speakers and invited minisymposia have been lined up. Details on the themes of the conference can be found on the SIAM web site. Assuming this meeting is as successful as the past meetings have been, we will continue to hold them on a biennial basis, in 2005 and 2007. We may explore opportunities to hold our meeting jointly with other activity groups, such as the new computational science group.

We will also continue to organize minisymposia at the annual meetings. We have been somewhat derelict at doing this for each annual meeting in the past, but we will make every effort to make our activity group more visible to the general membership.

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

SIAM has been very helpful to our activity group, especially in organizing meetings and helping to publish articles in *SIAM News* related to the geosciences. SIAM could help us to expand our group by making sure that other societies, such as AMS, AGU, etc. are aware of our activities. We also would like to create a geosciences email list, so that we can easily communicate with our members. In addition, if possible, perhaps SIAM could help us to create a geosciences web site under the SIAM web site.

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

The geoscience conferences have been excellent forums for promoting applied mathematics and computational science issues. These meetings have attracted scientists and engineers who normally might not belong to SIAM, thus we have helped SIAM reach out beyond the traditional applied mathematics community. Still, we can do more. We need to continue to promote geosciences research, especially to young Ph.D.s and graduate students. We need to expand our membership base, to include more aspects of the geosciences. We should also be involved in SIAM's efforts to increase funding for mathematical and computational science research.

This SIAG requests that the SIAM Council and Board of Trustees renew its charter for a three-year operating period beginning January 1, 2004.

Signed

Clint Dawson
June 3, 2002
