

## CHARTER RENEWAL APPLICATION

This CHARTER RENEWAL APPLICATION applies to the SIAM Activity Group on Optimization. The SIAM Activity Group (or SIAG) to which this renewal applies was originally formed under the aegis of SIAM on October 27, 1985, by the SIAM Council and December 14, 1985, by the SIAM Board of Trustees, with its initial operating period beginning January 1, 1986, and ending December 31, 1988. Its charter has been renewed by the council and board five times thereafter. This SIAG has 517 members as of May 15, 2002.

According to its Rules of Procedure, the objective of the SIAG is to provide an environment for interaction between applied mathematicians, computer scientists, engineers, scientists, and others interested in optimization. The SIAG aims to foster the development of methods, software, and theory for optimization, and to foster the use of optimization techniques in scientific and industrial applications.

Its purposed functions were to organize activities, including conferences, sessions at SIAM meetings, and publications, to (1) promote interaction between applied mathematicians, computer scientists, engineers, scientists, and others interested in optimization, (2) keep SIAM membership up to date on developments in optimization, and (3) facilitate development and application of optimization methods, software, and theory.

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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.

Following are the questions and replies from SIAG/OPT Committee:

Chair	Henry Wolkowicz
Vice Chair	Philippe L. Toint
Program Director	Anders Forsgren
Secretary/Treasurer	Natalia M. Alexandrov (maintainer of webpage)
Newsletter Editor	Jos F. Sturm

### **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?**

- (i) The field is vibrant and growing.
- (ii) The focus has shifted in part. More emphasis has been put on exploiting powerful configurations of computers. Significant advances have been made by a marriage of new theoretical advances with computing power to successfully tackle previously unsolved problems. (This is evident in the choice of our SIAG/OPT prize at the May/02 meeting.)
- (iii) In nonlinear programming, there is a growing emphasis on developing algorithms, software, and the attendant theory for large-scale problems of computational science and engineering, specifically, problems governed by numerical simulations and coupled numerical simulations that give rise to constraints expressed by differential equations. Among the special challenges are multi-physics and multiscale problems, mixed integer problems with a large number of variables, and very expensive optimization problems that arise in robust design or optimization under uncertainty.
- (iv) A greater emphasis has been put on robustness of algorithms.
- (v) Optimization Online is a repository of eprints about optimization and related topics for the optimization community, started in August/00. Optimization Online : <http://www.optimization-online.org>.

### **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?**

(i) The activity group is doing well though there has been a steady decrease during the last 6 years: 698, 744, 736, 691, 545, 517.

Possible reasons for the decline:

1.) We think there are declining numbers in the enrollment of graduate students in mathematical optimization and in sciences in general, at least those students who are likely to pursue research and become members of a SIAG (companies that historically did basic research are downsizing or eliminating research). The reasons for that are likely sociological and economical - we just appear to be on the down curve for student interest in research in sciences.

2.) NLP has reached a certain level of maturity, and there appears to be a growing acceptance of it in established science and engineering. So, students are likely to be drawn into an application area for optimization, such as engineering, bioinformatics, etc. People in those areas are primarily drawn to the societies that deal with their applications, not necessarily a general mathematical society.

3.) To remedy the declining numbers, we could try to make ourselves known to members of these other societies and organize SIAM/SIAG sponsored sessions in the conferences sponsored by other societies, e.g., AIAA, ISSMO, ASME. The chances are not great (people are not eager to pay membership fees for a new society), but there are some people, at least in the labs, that have recently become members of SIAM, in addition to their original societies. So, perhaps, more PR in professional journals of other societies is in order.

(ii) Members of the activity group are leaders in Optimization and they include people from diverse areas, e.g., Universities, National Laboratories, Independent Research Groups, and Industry. Interdisciplinary activity is high.

**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 main conference sponsored by the activity group was held in Toronto in May/02. More than 400 people attended - a large post 9/11 number. Feedback indicates that it was a huge success. Suggestions were made to increase the length of the conference next time, as there were too many parallel sessions. This shows that Optimization is an active research area and growing in size and importance, even though the membership numbers of the SIAG are decreasing.

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

Unknown.

*The following two minisymposia are listed in the SIAM50 final program as sponsored by the SIAM Activity Group on Optimization:*

*MS11: Frontiers of Optimization and MS 94: Recent Advances and Applications in Optimization. - jml*

**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?**

(i) The activity group maintains a web page: <http://mdob.larc.nasa.gov/staff/natalia/siagopt/>.

(ii) A regular newsletter is published with links from the webpage, see also <http://fewcal.kub.nl/sturm/siagopt/>. Each newsletter focuses on a research theme, typically on the cutting edge between optimization and an applied science. For this purpose, guest editors as well as authors are invited to contribute to a thematic newsletter.

(iii) The SIAG/OPT has a highly valued mailing list, on which the members announce their new technical reports, as well as conferences, workshops and other events.

(iv) A SIAG/OPT prize is presented at the triennial meeting. All these have been active and successful. The latest prize at the Toronto/02 meeting is for...

The paper by Anstreicher, Brixius, Goux and Linderoth is a landmark paper in computational optimization and also in the development of computational grids. It describes a number of important, coordinated advances in theory, algorithms and distributed computing. These ingredients are brought together to tackle and ultimately solve a number of outstanding extremely difficult quadratic assignment problems.

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

(i) We are planning on having minisymposia in other SIAM conferences, e.g., at the upcoming Scientific Computations SIAG meeting in San Diego. We plan on trying for SIAG organized minisymposia at the 2003 ISSMO (International Society for Structural and Multidisciplinary Optimization) symposium and at the AIAA MDO symposium in 2004. We are also considering a minisymposium at the 2003 SIAG/CSE meeting in San Diego (Omar [Ghattas] answered us in the positive about that).

(ii) We are planning on local collaboration, e.g., with the upcoming MOPTA conference (URL: <http://www.cas.mcmaster.ca/~mopta/>) and with the SIAM Great Lakes Section.

(iii) At this moment, we are working on two newsletters, one of them involving two guest editors.

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

We would like to audio record talks at the upcoming conference in 2005. We will start recording the plenary talks if possible. (video recording would be great if possible). SIAM can help in dealing with other societies while arranging for the minisymp; perhaps participate in the usual book exhibits to promote SIAM/SIAG publications. SIAM is usually of great assistance during organization of the triennial meeting.

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

The importance of optimization in many applied areas is becoming more visible, e.g., finance, production planning, scheduling, engineering design, etc. There are many researchers in these areas that use optimization and often "reinvent the wheel." The activity group can provide information on existing theory and algorithms. However, it is uncertain what the best medium for disseminating this information is. The NEOS server for optimization <http://www-neos.mcs.anl.gov/> has been one excellent source for such information. The members of SIAG play an active role in education and dissemination of information in their work and in personal interactions during conferences and visits. Promoting connections with other professional societies brings attention to SIAM and its agenda.

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

SIAG Chair Henry Wolkowicz  
Date: June 2002

for SIAG/OPT Committee:

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Vice Chair	Philippe L. Toint
Program Director	Anders Forsgren
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