

CHARTER RENEWAL APPLICATION

This CHARTER RENEWAL APPLICATION applies to the SIAM Activity Group on Orthogonal Polynomials and Special Functions. The SIAM Activity Group (or SIAG) to which this renewal applies was originally formed under the aegis of SIAM on July 15, 1990, by the SIAM Council and July 19, 1990, by the SIAM Board of Trustees with its initial operating period beginning January 1, 1990, and ending December 31, 1992. Its charter has been renewed by the council and board four times thereafter. This SIAG has 150 members as of March 31, 2003.

According to its Rules of Procedure, the objective(s) of the SIAG are to promote basic research in orthogonal polynomials and special functions; to further the application of this subject in other parts of mathematics, and in science and industry; and to encourage and support the exchange of information, ideas, and techniques between workers in this field, and other mathematicians and scientists.

The group is concerned with the following topics and their applications: general systems of orthogonal polynomials - asymptotic analysis, three-term recurrence relations and Markov processes, numerical quadrature, Julia sets, least-squares of orthogonal polynomials - harmonic analysis, approximation theory, representations of compact groups, quantum mechanics, combinatorics, coding and design theory; orthogonal polynomials in several variables - lie groups, tomography, optics, wave functions in crystals; special functions - for example, Bessel, gamma, theta, spheroidal wave, etc., solutions of partial differential equations, harmonic analysis of noncompact groups, statistical mechanics, integral transforms, number theory.

Its proposed functions were to include dissemination of information about upcoming conferences and sponsoring special sessions at SIAM meetings. Also, the group will assist researchers in the use of symbolic computer calculations by publicizing available software for special functions. Another goal is to establish some working relationships with the various SIAM journals, especially the one on mathematical analysis, with the view of sporadically sponsoring some invited or contributed articles.

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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.

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 is very active. Some measures of this can be obtained from OPSF-Net, the electronic newsletter of the activity group, which appears 6 times each year. OPSF-Net is distributed to an enlarged mailing list that includes nonmembers as well as members of the AG. The purpose of the newsletter is to provide useful information that is selected for dissemination because of its relevance to the field. Looking back at the 8 issues since January 1, 2002, and marking events sponsored or cosponsored by the activity group with an *, the following 26 conferences, workshops and summer schools were described in some detail (also see 3 below):

Orthogonal Polynomials and Special Functions

India (3/2002)

Spain (6/2002)

IMA Minneapolis (7/2002)

FoCM Minneapolis (8/2002)

* OPSF Belgium (8/2002)

* OPSF-SSFA India (9/2002)

AMS Madison (10/2002)
 AMS Baltimore (1/2003)
 * SIAM-CAIMS Montreal (6/2003)
 * OPSF Portugal (7/2003)
 OPSFA Denmark (8/2003)
 Netherlands (8/2003)
 Norway (8/2003)
 * AMS-SIAM Phoenix (1/2004)
 Approximation Theory
 Israel (2/2002)
 Spain (9/2002)
 Nashville (5/2003)
 AMS-RSME Spain (6/2003)
 Differential/Integral/Difference Equations
 Ukraine (5/2002)
 Greece (7/2002)
 France (6/2002)
 Switzerland (9/2003)
 Operator Theory
 Poland (5/2002)
 AMS-IMS-SIAM Snowbird (6/2003)
 Random Matrices
 UK (6/2002)
 Analysis, Applications and Computation
 ISAAC Canada (8/2002)

Another measure of the field is the number of articles in <http://arXiv.org>. Relevant ones are listed in every issue of OPSF-Net. On average, 32 articles were listed in each of the 8 most recent issues.

This level of activity in the field has been steady, and the overall focus has remained quite constant, over recent years. A significant recent development has been the ambitious project to rewrite and expand the old Abramowitz and Stegun Handbook of Mathematical Functions, which has involved approximately 50 participants. A notable feature of the planned new reference is that it will be disseminated electronically via the Web, in addition to being published in book form.

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 has maintained its membership levels, which shows that it is providing services of value to its members. Most members are active in research. As a group they keep up with, and contribute to, all developments in the field. Interdisciplinary activity occurs with computer scientists and mathematical physicists, e.g. in the handbook project described above.

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.

* OPSF Belgium (8/2002). This week-long summer school was oriented toward graduate and recent postgraduate students as well as young active researchers. It featured 6 invited lecturers speaking on computer algebra algorithms, Riemann-Hilbert analysis, exponential asymptotics, combinatorial enumeration, $3n-j$ coefficients, and Dunkl operators.

* OPSF Portugal (7/2003). The format is the same as OPSF Belgium (8/2002). It will feature 8 lecturers speaking on matrix moment problems, q -series, constructive approximation, Sobolev inner products, iteration theory, analytic number theory, birth and death processes, and hypergeometric transforms.

* OPSF-SSFA India (9/2002). This week-long conference, cosponsored by the Society for Special Functions and Applications, was held at the Institute of Mathematical Sciences, Chennai, India. As an interesting sidelight, SSFA grew out of a collaboration with the SIAM activity group that began in the 1990's. Conference topics included q-series, number theory, hypergeometric series, numerical methods, group theory, orthogonal polynomials, and applications to physics.

* SIAM-CAIMS Montreal (6/2003). There will be two minisymposia and a featured semi-plenary lecture sponsored by the activity group on the subject of Special Functions: Computational Methods and Applications.

* AMS-SIAM Phoenix (1/2004). There will be 20 speakers in a joint AMS-SIAM Special Session on Classical and Nonlinear Special Functions and their Applications.

The summer schools on OPSF held in Leuven, Belgium (August 2002) and Coimbra, Portugal (July 2003) are the latest in a series of annual Summer Schools sponsored by our AG that began in Laredo, Spain (July 2000) and Inzell, Germany (September 2001). Plans are in progress to publish lecture notes for all four summer schools, each of which attracted approximately 60 young researchers and other participants. This highly successful program of the AG will be continued in coming years.

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

There were no minisymposia at the San Diego or Philadelphia meetings. There will be two minisymposia at the Montreal 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?

The activity group distributes a printed newsletter 3 times a year and an electronic newsletter, called OPSF-Net, 6 times a year. For further information on OPSF-Net, see 1 above. The group operates a Web site at <http://math.nist.gov/opsf>. The Web site includes links to complete archives of the electronic newsletters in Maryland, Ohio and the Netherlands. The Ohio archive is searchable. These services provide the core benefits of the activity group to the majority of its members. A list service exists also but is used infrequently.

Officers of the AG are working with SIAM to establish a prize, to be called the Szego Prize after the important Hungarian mathematician Gabor Szego. Szego received his Ph.D. in Vienna in 1918. He remained in Europe at Budapest, Berlin, and finally Konigsberg, before leaving for Washington University (St. Louis) in 1934. He was head of the Mathematics Department at Stanford from 1938 until his retirement in 1960. He produced over 130 research articles and several books that remain influential today, the best known of which may be "Orthogonal Polynomials," published in 1939 by the American Mathematical Society.

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

First, revitalizing the information services (newsletters, Web site, list service). These services are operating well but we feel they could benefit from a thorough review. For example, it might be possible to avoid some duplication of effort that exists because information is being disseminated in three different ways. The wasted effort could be put to better use, for example, in expanding our book review program.

Second, the Szego Prize idea has been discussed among the AG officers, at membership meetings, and with SIAM officials. It has also been introduced to the entire membership in the newsletters. A written proposal needs to be prepared, approved by the membership, and transmitted to SIAM.

Third, sponsoring a conference on orthogonal polynomials, special functions, and related topics. It would be convenient to do this within the framework of the successful ongoing series of international conferences known as OPSFA (Orthogonal Polynomials, Special Functions and Applications) Symposia. The 7th of these will be held in Denmark (8/2003). The conferences are informally arranged, i.e. at each one someone offers to host the

next one. Discussions among the activity group officers have centered on offering to hold an OPSFA conference in Washington, DC, under the auspices of SIAM and our activity group, and the idea has also been discussed with SIAM officials.

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

First, by continuing its helpful support of the prize and conference ideas mentioned above.

Second, by giving serious consideration to the idea of adding OPSF to the statement of purpose of the SIAM Journal on Mathematical Analysis (SIMA) and adding at least one editor to the Editorial Board of SIMA with responsibility for this area of applied mathematics. We feel that OPSF articles that do not have a direct connection to physics or another field of application of mathematics should be published in SIMA, as they were when the journal was founded. Our view is that special functions are tools, just like linear algebra, that are part of the basic infrastructure for solving applied problems.

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

We believe special functions play an important role in mathematical and computational sciences, and we believe we can help bring about a wider appreciation of this role among SIAM members, and through SIAM programs and publications, in the scientific public at large.

This SIAG requests that the SIAM Council and Board of Trustees renew its charter for a three-year operating period beginning January 1, 2005.

Signed

Daniel W. Lozier
SIAG/OS Chair
May 19, 2003
