

## 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 five times thereafter. This SIAG had 134 members as of December 31, 2006.

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.

Its purposed functions were to:

- 1) Organize minisymposia at the SIAM Annual Meeting on years where there is no SIAG conference.
- 2) Organize a track of at least six minisymposia at the SIAM Annual Meeting at least once every five years.

This SIAG does not have a regularly scheduled conference, though there is a biennial conference on "*Orthogonal Polynomials, Special Functions and Applications*" (the ninth in the series took place in Luminy, France in July 2007), which essentially serves acts as one.

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 covered by the SIAG is active and flourishing as evidenced by the number of meetings, which involve a healthy number of younger researchers and women (though this is not reflected in the membership of the SIAG).
  - During the past few years, there has been more emphasis in the field on so-called  $q$ -extensions to orthogonal polynomials and difference, together with developments in Riemann-Hilberts methods to study asymptotic problems associated with special functions and orthogonal polynomials.
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 membership in the SIAG has remained relatively steady over the last several years. At the end of the last calendar year it had 134 members, of which 19 were students. The peak membership year for the SIAG was 1999 when it had 172 members.

- The field covered by the SIAG lies on the boundary of Pure and Applied Mathematics, so a significant number of researchers in the field do not necessarily see SIAM as the professional body which they should be a member of. The SIAG has a high percentage (52%) of its members from outside the USA, which reflects the fact there is considerable interest in the field outside the USA, in particular Europe. Hence researchers in the field outside the USA tend to members of their national Mathematical societies, and SIAM only has a reciprocal membership agreement with three Societies (in Germany, Holland and Spain), which is in contrast to number of reciprocal membership agreements that the American Mathematical Society has.
  - The SIAG is continuing to develop links with other Mathematical communities, in particular “Foundations of Computational Mathematics” and “Symmetries and Integrability of Difference Equations”, which assists in its keeping up with the changes in the field.
  - The activities of the SIAG advance the application of mathematics and computational science and promote research that will lead to effective new mathematical and computational methods and techniques for science, engineering, industry, and society, which are two of the goals of SIAM.
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.
- An AMS-SIAM Special Session on “*Classical and Nonlinear Special Functions and their Applications*,” took place at the Joint Mathematics Meeting in Phoenix, Arizona, January 7th–10th, 2004, organized by Peter Clarkson, Francisco Marcellan and Peter McCoy.
  - A workshop on “*Special functions and orthogonal polynomials*” was part of the conference “*Foundations of Computational Mathematics*”, took place in Santander, Spain, June 30th–July 2nd 2005. This was organized by Mourad Ismail, Guillermo Lopez, and Ed Saff and involved twenty talks.
  - A conference on “*Special Functions: Asymptotic Analysis and Computation*”, took place in Santander, Spain, July 4th–6th, 2005. This meeting was in honor of the 65th birthday Nico Temme, a member of the SIAG and organized by Amparo Gil, José Luis López, Adri Olde Daalhuis, Javier Segura and Peter McCoy.
  - The 8th conference on “*Orthogonal Polynomials, Special Functions and Applications*” took place in Munich, Germany, July 25th–30th, 2005. This was as part of the conference “*Difference Equations, Special Functions and Applications*”, which was a joint meeting of three communities working in the fields of difference equations, special functions and applications, namely OPSFA (Orthogonal Polynomials, Special Functions and Applications), ICDEA (International Conference on Difference Equations and Applications), and SIDE (Symmetries and Integrability of Difference Equations). Whilst there already were links with the “SIDE community”, which has a biennial meeting that alternates with the biennial OPSFA meeting, there were fewer links with the “ICDEA community” and little has changed as a consequence of this meeting in Munich.

- There was a short programme on “*The Painlevé Equations and Monodromy Problems*” at the Isaac Newton Institute for Mathematical Sciences, Cambridge, UK, in September 2006, organized by Philip Boalch, Peter Clarkson, Lionel Mason, and Yousuke Ohyama.
  - A special session on “*Special Functions and Orthogonal Polynomials*” took place at American Mathematical Society’s Spring Western Sectional Meeting in Tucson, AZ, April 21st–22nd, 2007, organized by Diego Dominici and Robert Maier.
  - The 9th conference on “*Orthogonal Polynomials, Special Functions and Applications*” took place in Luminy, France, July 2nd–6th, 2007. There were about 150 participants at this meeting, with 20 plenary talks and 87 contributed talks.
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 tract of minisymposia at an annual meeting?
- The SIAG organized a minisymposium at the SIAM annual meeting in 2006: “*Computation and Application of Special Functions in Scientific Computing*,” Boston, MA, July 14th, 2006, Co-Chairs & Organizers Dan Lozier NIST, Gaithersburg & Peter A. McCoy, U.S. Naval Academy.
  - The SIAG organized a minisymposium at the ICIAM in 2007: “*The Math on the web: content development and implementation*,” Zurich, Switzerland, July 16th–20th, 2007, organized by Daniel Lozier, Abdou Youssef, and Bruce Miller.
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 has a newsletter, OP-SF NET, which is an electronic news bulletin in the area of Orthogonal Polynomials and Special Functions. It is transmitted to members of the SIAG six times a year. Topics covered by it include announcements of conferences, forthcoming books, new software, electronic archives, research questions, and job openings. The Editors are Diego Dominici and Martin Muldoon. This newsletter is highly thought of, extremely useful, and is much appreciated by members of the SIAG.
  - The SIAG has a website <http://math.nist.gov/opsf/> which provides much useful information for members of the SIAG, including back issues of the newsletter.
6. What activities are planned and proposed for the next period of the charter? Please describe scheduled and suggested future activities in detail.
- The following conferences and special sessions are due to take place:
    - \* A conference in “*Special Functions, Information Theory and Mathematical Physics*”, in honor of Jesús Dehesa’s 60th birthday, is to take place in Granada, Spain, September 17th–19th, 2007.
    - \* A special session on “*Special Functions and Orthogonal Polynomials*” is part of the first Joint Meeting of the American Mathematical Society and the New Zealand Mathematical Society will be held in Wellington, New Zealand, December 12th–15th, 2007. This is organized by Diego Dominici, Ole Warnaar and Shaun Cooper.

- \* An AMS-SIAM Special Session on “*Asymptotic Methods in Analysis with Applications*” is to take place at the Joint Mathematics Meetings in San Diego, CA, January 6th–9th, 2008, organised by Diego Dominici and Peter McCoy.
  - \* A workshop on “*Special Functions and Orthogonal Polynomials*” is part of the conference “*Foundations of Computational Mathematics*”, which is to take place in Hong Kong June 16th–18th 2008. This is organized by Peter Clarkson, Mourad Ismail, Guillermo Lopez, and Ed Saff.
  - \* The 10th conference on “*Orthogonal Polynomials, Special Functions and Applications*” is to take place in Belgium in 2009.
- There is to be a six-month programme on “*Discrete Integrable Systems*” at the Isaac Newton Institute for Mathematical Sciences, Cambridge, UK, to take place January–June 2009, which is closely related to the field of the SIAG.
  - Other proposed activities during the next period of the charter include the organization of :
    - (i), A conference in the USA (probably to coincide with the launch of the “*Digital Library of Mathematical Functions*”, see below).
    - (ii), A Summer School for postgraduate students and postdoctoral researchers.
7. How can SIAM help the activity group achieve its goals?
- SIAM can help the SIAG by giving member of the SIAG an opportunity to publish in an SIAM journal. Currently there appears to be no SIAM journal which is appropriate for our SIAG members to submit to. Further no member of the SIAG is a member of the Editorial board of any SIAM journal. Previously the SIAM Journal of Mathematical Analysis published papers in the field (about 12–15 papers per year in the 1980’s and early 1990’s), but now this is down to one per year, on average, since 2000.
  - SIAM can work together with the SIAG to attract more members, in particular with what SIAM membership can do for potential members who don’t live in the USA.
8. How can the activity group help SIAM in its general role of promoting applied mathematics and computational science?
- As a Mathematical tool, orthogonal polynomials and special functions are extensively used by Applied Mathematicians as well as Physicists, Chemists, Engineers, etc. This is evidenced, for example, by the sales and references to Abramowitz and Stegun’s “*Handbook of Mathematical Functions*”, which was published over fifty years ago. There is a current project (the “*Digital Library of Mathematical Functions*” project coordinated by Dan Lozier and Frank Olver at the National Institute for Standards and Technology, Gaithersburg, MD) to revise and update Abramowitz and Stegun’s book which is nearing completion.

This SIAG requests that the SIAM Council and Board of Trustees renew its charter for a three-year operating period beginning January 1, 2008.

Peter Clarkson, Chair SIAG OPSF  
July 5th, 2007