

Final Scientific and Technical Report

Department of Energy

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Title: Support for Recognition of Women and for Activities for Women in Mathematical Sciences at National Meetings

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- August 1, 2007 – July 31, 2010 with a no-cost-extension August 1, 2010 – March 31, 2011.
- April 1, 2011 – March 31, 2014 with one year no-cost-extension through March 31, 2015.

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The Association for Women in Mathematics (AWM) seeks to advance the rates of participation by women in events at national mathematical sciences conference primarily in the U.S. The first component is the lecture series (Noether, Kovalevsky and Falconer Lectures) named after celebrated mathematicians, and featuring prominent women mathematicians, with the result that men, as well as women, will learn about the achievements of women in the mathematical sciences. The second component is AWM's "Workshops for Women Graduate Students and Recent PhDs," which select junior women to give research talks and research poster presentations at the annual Joint Mathematics Meeting and at the SIAM Annual Meeting. This grant supported the SIAM Annual Meeting component. The workshop activities allow wider recruitment of participants and increased attention to mentoring. The third component is the AWM's 40<sup>th</sup> Anniversary Research Symposium, 2011. These activities have succeeded in increasing the number of women speakers and presenters at meetings and have brought more women attendees to the meetings.

### **Lecture Series**

The AWM in conjunction with major mathematics organizations annually holds 3 prestigious invited lectures at 3 highly attended national and international conferences. This grant supported 22 women lecturers. (See Table 1.) These plenary lecture sessions receive high visibility at each of the meetings. Typically, 200 – 250 attendees are in the audience.

The **AWM-SIAM Sonia Kovalevsky Lecture** is given at the Society for Industrial Applied Mathematics (SIAM) Annual Meeting and every fourth year at the International Congress on Industrial and Applied Mathematics (ICIAM). The lecture is given by a woman who has made distinguished contributions in applied or computational mathematics.

The **AWM-AMS Noether Lecture** (formerly the AWM Noether Lecture) is given at the annual Joint Mathematics Meeting (JMM). This expository lecture features a woman who has made fundamental and sustained contributions to the mathematical sciences.

The **AWM-MAA Etta Z. Falconer Lecture** is given at the annual summer meeting of the Mathematical Association of America, MathFest. This expository lecture is given by women in the scientific or engineering community.

**Table 1. AWM Lecture Series**

Year	AWM-SIAM Sonia Kovalevsky Lecture (Spring/Summer)	AWM-AMS Noether Lecture (January)	AWM-MAA Etta Z. Falconer Lecture (August)
2007	NA	NA	Katherine St. John, City University of New York
2008	Dianne P. O'Leary, University of Maryland	Audrey Terras, University of California, San Diego	Rebecca Goldin, George Mason University
2009	Andrea Bertozzi, University of California, Los Angeles	Fan Chung Graham, University of California, San Diego	Katherine Okikiolu, Stony Brook University
2010	Suzanne Lenhart, University of Texas at Knoxville	Carolyn Gordon, Dartmouth University	Ami Radunskaya, Pomona College
2011	Susanne C. Brenner, Louisiana State University	M. Susan Montgomery, University of Southern California	Dawn A. Lott, Delaware State University
2012	Barbara Keyfitz, Ohio State	Barbara Keyfitz, Ohio State	Karen King, New York University
2013	Margaret Cheney, Colorado State University	Raman Parimala, Emory University	Patricia Kenschaft, Montclair State University (emeritus)
2014	Irene Gamba, University of Texas at Austin	Georgia Benkart, University of Wisconsin-Madison	Marie Vitulli, University of Oregon (emeritus)

#### AWM Workshops for Women Graduate Students and Recent PhDs

The goals of the annual workshops are to provide support and encouragement to women of demonstrated talent as they enter a career in research mathematics and also to showcase to the larger mathematical community the outstanding achievements of young women mathematicians. Workshop activities include research presentations, career panels/symposia, and mentoring.

#### Research presentations

Held in conjunction with the SIAM Annual Meeting and ICIAM (Vancouver, Canada) in 2011, the workshops include up to 20 women graduate students and postdocs ("postdoc" refers to any woman who has completed her PhD within the past 5 years) usually including 12 graduate students and 8 postdocs. The graduate students were selected on a competitive basis. The postdoc speakers were selected from a competitive process, as well, as by invitation. The grant provided travel and subsistence support for the women to attend the conferences. A total of 122 women (graduate students and PhDs) presented at the 7 AWM workshops held at the SIAM Annual Meetings and at ICIAM from 2008 to 2014. Of the 122 women 67 or 54.9% were graduate students and 55 or 45.1% were PhDs. Of the 122 women presenters a total of 88 or 72.1% received travel support provided by the grant. Additionally, the grant supported travel for 7 panelists/speakers at the 2011 ICIAM AWM workshop. (See Table 2.)

**Table 2. Workshops and Research Symposium participants, panelists, and speakers\***

Year	SIAM		AWM 40 <sup>th</sup> Anniversary, ICIAM '11			ICIAM '11			AWM 40 <sup>th</sup> Anniversary, 2011 Research Symposium			
	Graduate students	Recent PhDs	Graduate Students	Recent PhDs	Totals		Speakers	Totals		Graduate Students	Speakers	Totals
2008	11				11							
2009	11				11							
2010	8	4			12							
2011			8	7	15		7	7		22	4	26
2012	8	8			16							
2013	10	8			18							
2014		5			5							
Totals	48	25	8	7	88		7	7		22	4	26

\*These figures reflect the women who received travel support from the DOE grant.

The workshops are widely publicized, both through advertisements and through direct electronic mailings to mathematic department chairs, to encourage women at all levels to attend. The AWM Workshops are open to all SIAM Annual Meeting and ICIAM attendees. The invited postdocs give 20-minute presentations of their research. The invited graduate students present their research in a poster session. The poster format has proven to be very successful as it allows participants to circulate and interact with each other, senior researchers, and provides exposure to prospective employers.

The 2011 AWM Workshop was titled “AWM 40<sup>th</sup> Anniversary Embedded Meeting at ICIAM 2011.” In addition to the regularly scheduled activities, the embedded meeting featured research talks by women who have made fundamental contributions to applied mathematics, a panel discussion on professional and research leadership, and a symposium on opportunities for mathematics beyond academia. Starting in 2012, the AWM Workshop talks were thematic. In 2012 the workshop was titled “Mathematical Biology Research Talks by Recent PhDs,” in 2013, “Mathematics of Planet Earth (MPE) Research Talks by Recent PhDs,” and in 2014, “Numerical and Theoretical Approaches for Nonlinear Partial Differential Equations.” All of the graduate student poster sessions were presentations of general mathematics research. Starting in 2014, AWM held a poster contest in conjunction with the graduate student poster presentations at SIAM.

#### Career Panels/Symposia

Panelists, drawn from liberal arts colleges, major research universities, industry, and government labs use personal experience to address all aspects of launching a successful mathematical career. The career panels/symposia address career development issues. Examples of the topics are “Success through Transitions,” “A Balancing Act,” “Learning from Our Experiences,” “Shaping your Career in Mathematics,” and “Teaching, Research, and Family: Who Has the Time?” All meeting attendees are invited. Typically, 75 – 100 attendees are in the audience. The highlights of the panel discussions are published in the *AWM Newsletter* (subscription base of 3,000+) so as to reach a larger audience. The panelists also serve as excellent role models.

#### Mentoring

Participants, in particular, the graduate students, are matched with a “mentor” – a more senior woman mathematician matched according to research interests. The mentors provided advice and support during the workshop and may provide constructive feedback on improving the talk or the poster presentations of the mentees. A networking event, either a luncheon or reception, is held to enable additional time for mentors and mentees to interact, as well as, for the women to network with their peers.

#### 2011 Research Symposium

The first AWM 2-day research symposium titled, “40 Years and Counting: AWM’s Celebration of Women in Mathematics,” was held September 17 – 18, 2011 at Brown University. This research symposium was attended by more than 300 women and men. The program included 4 plenary lectures in pure and applied mathematics by distinguished researchers, 36 special sessions on a broad spectrum of mathematical research which featured 135 women speakers, and 3 graduate student poster sessions. Each of the 3 poster sessions included 11 posters, for a total of 33 posters, which displayed the work of women in their early-careers (no more than 3 years beyond their PhD degree or still a graduate student). The grant provided travel support for 22 graduate students and 4 speakers. (See table 2.)

#### Evaluation of events supported by the grant.

All workshop participants were required to complete a brief survey after the event. Overall the survey responses were very positive. All 122 participants or 100% responded that the workshop was useful and would recommend the workshop to friends and colleagues. Please see Table 3 for a summary of the feedback from the 122 participants who attended the SIAM and ICIAM workshops.

**Table 3. Post-workshop survey responses from workshops participants.**

Questions	Possible responses	Responses
A1. – A5.	Not important, Somewhat important, Important, Very important, Extremely important	
A1. Opportunity to present my research		97.5% responded: Important, Very important, Extremely important
A2. Opportunity to hear about others' research		94.3% responded: Important, Very important, Extremely important
A3. Opportunity to meet other women graduate students & postdocs		99.1% responded: Important, Very important, Extremely important
A4. Opportunity to meet senior women mathematicians		98.4% responded: Important, Very important, Extremely important
A5. Opportunity to attend SIAM/ICIAM conference		96.7% responded: Important, Very important, Extremely important
B1. The mathematical presentations were accessible.	Not accessible, Somewhat accessible, Accessible, Fairly accessible, Very accessible	93.4% responded: Accessible, Fairly accessible, Very accessible
C1. Were the mentoring and networking opportunities at the workshop helpful?	Not helpful, Somewhat helpful, Helpful, Fairly helpful, Very helpful	93.4% responded: Helpful, Fairly helpful, Very helpful
D1. Overall, did you find the workshop useful?	Yes or No	100% responded: Yes
E1. Would you recommend future AWM workshops to friends and colleagues?	Yes or No	1005 responded: Yes

In addition to the survey ratings participants provided open-ended comments. On occasion respondents indicated that the mentoring component of the workshop could have been a more helpful experience. This is an issue we continue to address. The majority of respondents' comments indicated positive experiences. Here are some examples.

- "I'm really thankful that I have the opportunity to present my poster and receive comments and suggestions from other. People showed their interest in my work and communicated with me in details. It was really helpful."
- "This was a great opportunity to present at the SIAM conference and I made many valuable connections that will be helpful for me as I participate in the applied mathematics community in the future."
- "It was a great event. In particular my mentor gave me very valuable suggestions and advice."
- "I really enjoyed the AWM workshop. The organizing coordinators did a splendid job in making sure that all the participants were well taken care of. The poster sessions and the talks were really good. I got to meet with people and establish contact with people in both academia and industry which was definitely a plus. Thank you AWM. Without your financial support it would have been hard for me to attend the conference. I would have liked to have more opportunity to meet and interact with more AWM members. One of my favorite parts was hearing the postdoc research presentations. They were excellent and I now have an interest in possibly doing a postdoc in mathematical biology as a result of hearing those presentations."
- "I thoroughly enjoyed the workshop. The talks related to "Balancing Act", was particularly useful. It was very encouraging to see that women can manage both work and home with equal efficiency. I presented a poster on Tuesday... and I kept wondering if anyone would be there that late, but the turnover was wonderful. I enjoyed speaking about my work, and getting opinions from professors and students. The mentoring program was also helpful. I hope to keep in touch with my mentor from time to time. It always helps in getting a suggestion from somebody outside your circle, as they might see things with a different perspective. On the whole, a great experience and I enjoyed it thoroughly; hope to be a regular here on."
- "I truly enjoyed the opportunity to present my research and to network. It was great to be around successful female mathematicians."

- “The workshop was well-organized, and I especially enjoyed the talks given by leading women (the Monday morning talks were very very good -- I haven't seen a lot of talks given by women in mathematics, and it was refreshing to see so many that were so good). My only suggestion would be (and perhaps this was already done, but couldn't be done exactly) to match mentors by field so that the feedback given after my talk might be one I'd receive at a more specialized conference or by a potential collaborator or a potential employer. Thanks so much for such a great opportunity.”