

DEPARTMENT OF MATHEMATICS

VIGRE Funding Report**(due 30 days after semester of support)****Semester/Summer and Year:**

Fall 2008

Name: Michele Reilly

List the graduate courses you have taken this semester (including independent studies), your grades, and the instructors:

Course	Title	Grade	Instructor
534	Geometry	B	Doug Pickrell
511	Algebra	B	Kirti Joshi
599	Ricci Flow -reading course	S	Andrea Young

List the title, date and location of any talks you have given, either here or elsewhere:

Columbia University, Applied Physics & Applied Mathematics (APAM)
May 2, 2008

In this talk, reported on several numerical techniques for partial differential equations that have been developed through an integrated study of how a PDE system should be discretized (by finite elements, for example) and how the resulting discrete systems can be practically and effectively solved by multigrid. As an example, presented a discretization scheme for various mathematical models for Non-Newtonian fluids. One important feature of this method is that, at each time step, the discretized system is reduced to one linear system and a number of independent ODEs, which can be solved efficiently and in parallel.

If you are working on your dissertation, include a one paragraph description of your research progress. If you have not yet begun dissertation research, describe your progress toward finding a dissertation topic and advisor and beginning that research.

(Please see attached).

List publications, if any.

Check all activities you completed during the funded period:

Academics:

- Independent Study
- Oral Comprehensive Exam
- Commence Thesis Research
- Conference attendance
- Conference participation
- Complete PhD

Professional development and outreach:

- AP Calculus Visit
- High School Workshops
- Undergraduate Research Project
- Undergraduate Research Seminar
- Super TA
- Mentoring junior graduate students for the qualifying exams
- RTG (help organize)
- Research Seminar (help organize)

Other (please specify)

Attach a brief statement about your academic progress and professional development during the period of support.

Michele Reilly - VIGRE Report Fall 2008

During the Fall 2008 semester, I have attended the core graduate courses in Geometry, Algebra, and Analysis. These courses contain the essential material required for any future research in mathematics. They are also designed to help prepare for the qualifying examinations in the summer of 2009. Successful completion of these examinations is the first step toward advancing in the doctoral program in Mathematics at The University of Arizona.

In addition to core coursework, last semester, I participated in an independent study with Andrea Young on the subject of geometric flows. In previous coursework at Columbia University, I studied the Ricci flow as a means to find a metric of constant scalar curvature on a compact smooth surface. With Andrea Young, I had the opportunity to discuss the Ricci flow as a means to classify 3 manifolds. We looked at a short time existence theorem for the Ricci flow with an arbitrary smooth initial metric. We established several standard curvature variations and forms of solitons.

During this period, I have applied for and received competitive funding from both The University of Texas, Austin in September 2008, and the NSF administered by Princeton University, to attend the Nonlinear Geometric Analysis Conference in October 2008. Both conferences were focused on current research trends in Geometric Analysis and Differential Geometry. This subject is of great interest to me and my propensity for further study have been influenced both by informal discussions and speakers from these events. There are a number of interesting open problems concerning Ricci flow in dimension 3, and, in higher dimensions much less is known. I hope to continue to investigate open problems in this area.