

DEPARTMENT OF MATHEMATICS

VIGRE Funding Report

(due 30 days after semester of support)

Semester/Summer and Year:

Summer 2009

Name:

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

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

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.

See attached.

List publications, if any.

(in preparation) "A vortex force analysis of rip current stability", B. Weir, Y. Uchiyama, E. M. Lane, J. M. Restrepo, and J.C. McWilliams, J. Geophys. Res.

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)

Assisted with the Integration Workshop.

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

VIGRE REPORT, PART II
SUMMER 2009

BRAD WEIR

During the summer of 2009 I completed much of the work that will make up the first of two parts of my dissertation, I attended a two-week graduate workshop at MSRI on inverse problems, and I assisted with the integration workshop.

The workshop at MSRI was focused on the solution of inverse problems. The most well known of these problems is Calderon's problem, which asks whether the map that sends Dirichlet boundary data to Neumann boundary data uniquely determines the conductivity inside a simply connected domain. The answer to this question under very general regularity conditions is yes. The study of such problems has wide-ranging applications from magnetic resonance imaging, electrical impedance tomography, and seismic imaging. My interest in inverse problems is their use in remote sensing of the ocean surface. The workshop consisted of a number of lectures, computer lab sessions where the students developed Matlab routines to solve specific problems, and problem sessions where the students solved problems related to the lecture material.

During the summer I also finished computing the numerical results whose analysis will constitute a paper I plan on submitting to the Journal of Geophysical Research. This is work in collaboration with Juan M. Restrepo, Jim McWilliams and Yusuke Uchiyama (both at UCLA). The bulk of the analysis of these results is complete, but the paper still requires the resolution of some technical details before it is fit for submission. I plan on finishing this within the next month.