

DEPARTMENT OF MATHEMATICS

VIGRE Funding Report

(due 30 days after semester of support)

Semester/Summer and Year:

Summer 2008

Name: Yuliya Gorlina

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

Course	Title	Grade	Instructor
none			

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

na

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.

This summer, I continued working with David Glickenstein towards completing my comprehensive exam and finding a dissertation topic in the field of Discrete Differential Geometry. I worked on the written portion on my comprehensive exam on the paper by Bobenko and Izmistiev "Alexandrov's theorem, weighted Delaunay triangulations, and mixed volumes." I also read a portion of a paper by Edelsbrunner and Shah "Incremental Topological Flipping Works for Regular Triangulations." One possible direction for my dissertation topic would be to extend ideas of Edelsbrunner and Shah to a more general situation.

List publications, if any.

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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)

Working with undergraduates as part of Glickenstein's research lab; Integration workshop.

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

VIGRE Report

Part II

Yuliya Gorlina

September 12, 2008

Study, research, and professional development

This summer, I continued working towards completing the comprehensive exam with David Glickenstein. In the spring, I finished reading a paper by Bobenko and Izmistiev “Alexandrov’s theorem, weighted Delaunay triangulations, and mixed volumes.” During the summer, I worked on making the paper more clear by choosing different notation, motivating definitions, and giving more details in proofs.

In addition, I am a part of Glickenstein’s research lab, a group which includes undergraduate and graduate students working on problems related to geometric triangulations and geometric flows. The lab approaches problems from two directions: computational and theoretical. In addition, we will create visualizations of geometric triangulations and geometric flows which would be accessible to mathematicians who work in other fields, as well as the popular public.

One of the goals of the lab is to prove the existence of and construct an algorithm which would produce a weighted Delaunay triangulation of a manifold other than \mathbb{R}^n . The algorithm for \mathbb{R}^n is given in Edelsbrunner and Shah’s paper “Incremental Topological Flipping Works for Regular Triangulations.” I read portions of this paper in order to understand which properties of \mathbb{R}^n make the algorithm work. With help from Prof. Glickenstein, I will try to come up with the necessary conditions to create an algorithm for other manifolds.

The computational aspect of the lab involves programming known geometric triangulations and flows, as well as testing new ones. Programming is done primarily by the undergraduate students, with help and input from others. In addition to answering students’ questions related to their program, I provided feedback on the mathematics and writing in their summer research report.

At the end of the summer, I participated in the Integration Workshop. During the workshop, I assisted with the problem and project sessions by answering questions. In addition, I used this opportunity to get to know the students and help them transition to this new stage of their lives.