

**Stony Brook University
The Graduate School**

Doctoral Defense Announcement

Abstract

On the Complexity of Real and Complex Functions

Defined on the Two-dimensional Plane

By

Fuxiang Yu

Computational complexity is a central area of theoretical computer science. Corresponding to the objects being studied, there are two categories: continuous complexity and discrete complexity. Although there is significant progress in the continuous side, it is fair to say that, compared with discrete complexity theory, more work could and should be done in continuous complexity theory. For instance, a fundamental issue in continuous complexity theory is the lack of a single, universal computational model that all researchers agree upon. Another major issue is that the computational complexity of many fundamental problems in computational mathematics is not known or not even attacked at all. An example is the computational complexity of analytic continuation problem.

In this thesis we study the computational complexity of a few fundamental problems in continuous mathematics. The basic computational model we used in this thesis is the oracle Turing machine model of Ko and Friedman, in which complexity is measured by the number of bit operations needed to output an approximation to the results within a required precision. Our goal is to gain insights into continuous complexity and the relations between continuous complexity and discrete complexity through this study.

Date: June 29, 2007

Program: Computer Science

Time: 2:00pm

Dissertation Advisor: Prof. Ker-I Ko

Place: 2311, Computer Science Building