

THE UNIVERSITY



OF HONG KONG

*Institute of Mathematical Research
Department of Mathematics*

GEOMETRY SEMINAR

Distribution of Poles of Tritronquée Solutions to the First Painlevé Equation

Dr. Min HUANG

City University of Hong Kong

Date: March 11, 2014 (Tuesday)

Time: 4:30 – 5:30pm

Venue: Room 210, Run Run Shaw Bldg., HKU

Abstract

The first Painlevé equation admits a family of special solutions called tritronquée solutions, which play important roles in quantum mechanics, fluid mechanics, and plasma physics. Based on numerical evidence, Dubrovin, Grava, and Klein conjectured that the tritronquée solutions have no pole in the complex plane except in a sector of angle $2\pi/5$. In this presentation, we introduce a rigorous computational method for finding accurate global approximations of the tritronquée solutions with rigorous error bounds. This constructive approach allows us to prove the aforementioned conjecture, as well as part of Joshi and Kitaev's conjectures on numerical values of the tritronquée solutions. The general method has been applied to spectral problems arising in the theory of nonlinear equations, as well as boundary layer problems in fluid mechanics. We will also discuss possible applications to the study of homoclinic orbits and stabilities and singularities of PDEs. This presentation is based on the joint work with Prof. Ovidiu Costin and Prof. Saleh Tanveer.

All are welcome