THE UNIVERSITY   **OF HONG KONG**

Institute of Mathematical Research
Department of Mathematics

Geometry Seminar

The "Hole Story": how to solve problems in multiply connected domains

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Date: October 25, 2012 (Thursday)

Time: 4:30 – 5:30pm

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

Abstract

Motivated by problems arising in the applied sciences, this talk surveys a new theoretical approach to solving problems in multiply connected planar domains as developed by the speaker (and his group) in recent years. Multiply connected domains are "regions with holes" and are ubiquitous in applications; whenever two or more objects/entities interact in some ambient medium the analysis may call for the methods discussed in this lecture.

We will advocate the use of ideas from constructive function theory and complex analysis to provide quasi-analytical solutions to such problems in terms of the so-called "Schottky-Klein prime function" — a very important classical special function that is hardly known to non-specialists but which is relevant to a surprisingly wide range of applied mathematical problems often facilitating concise and elegant representations of their solutions.

Some illustrative example problems from applications will be described and their solutions explicitly constructed. We will also give details of freely available numerical codes that we have developed for the computation of the prime function in order to promote its wider use.

We hope to demonstrate that the new methods are sufficiently general that they provide broad scope for tackling a variety of mathematical problems.

All are welcome