The Department of Mathematical Sciences presents a colloquium with

Dr. Robert Rettinger

University of Hagen, Germany

Thursday, November 12, 2009
4 – 5 pm
316 Braunstein Hall

Computability and Complexity of Julia sets

Abstract:

Julia sets provide some of the most striking illustrations of how an apparently simple process can lead to highly intricate sets. Since they are a seemingly inexhaustible source of fantastic shapes and images, numerous computer programs have been written for generating pictures of Julia sets. However, no reliable high-precision pictures of non-trivial Julia sets are currently known. Usually, no error estimates are included and even those algorithms which work reliably in theory become unreliable in practice due to rounding errors and the use of fixed-length floating point numbers.

In this talk, we will show how Julia sets can be computed up to arbitrary precision very efficiently, i.e., in polynomial time, for the most common case of hyperbolic polynomials. Additionally, we will survey some recent computability and non-computability results on Julia sets of other kinds of polynomials and discuss how these results can be extended to rational functions or even further.

Refreshments will be served at 3:30 pm
in the Faculty & Graduate Student Lounge
Room 840 of the Old Chemistry Building

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