Colloquium

Chaotic dynamics meets computer science: a study of computability of Julia sets.

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Abstract

Numerical simulation has played a key role in the study of dynamical systems, from modeling ecosystems to weather simulations. Archetypical examples of complex fractals generated by simple non-linear dynamical systems are Julia sets of quadratic polynomials. Computer-generated images of Julia sets are among the most familiar mathematical images, enjoyed both for their beauty and for the deep theory behind them. In a series of works with M. Braverman and others we have put to the test the modern paradigm of numerical simulation of chaotic dynamics, and asked whether images of Julia sets can always be computed if the parameters are known. My talk will describe some of the surprising results we have obtained. No prior knowledge of the subject is required, I will only assume familiarity with the basic Complex Analysis.