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Mathematics : Algorithms

Braverman, Mark, Yampolsky, Michael

Computability of Julia Sets

- **The first book describing in detail some spectacular results on computation and complex dynamical systems.**

Among all computer-generated mathematical images, Julia sets of rational maps occupy one of the most prominent positions. Their beauty and complexity can be fascinating. They also hold a deep mathematical content. Computational hardness of Julia sets is the main subject of this book. By definition, a computable set in the plane can be visualized on a computer screen with an arbitrarily high magnification. There are countless programs to draw Julia sets. Yet, as the authors have discovered, it is possible to constructively produce examples of quadratic polynomials, whose Julia sets are not computable. This result is striking - it says that while a dynamical system can be described numerically with an arbitrary precision, the picture of the dynamics cannot be visualized. The book summarizes the present knowledge (most of it from the authors' own work) about the computational properties of Julia sets in a self-contained way. It is accessible to experts and students with interest in theoretical computer science or dynamical systems.

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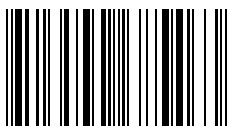
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