The Mandelbrot set and its cubic analog

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Abstract

The Mandelbrot set is perhaps the most famous (outside of the mathematical community) fractal image. This set describes the way the dynamics of a quadratic polynomial changes as the complex parameter varies. Looking just at the location of the parameter relative to the Mandelbrot set, one can say a lot about the dynamical properties of the polynomial (whereas an explicit expression is by far less convenient). We will describe the structure of the Mandelbrot set and in particular its (conjectural) topological model. I will also give a brief overview of the research aimed at finding the structure of the cubic Mandelbrot set. In particular, I will describe a combinatorial model for the space of all dendritic cubic polynomials, partially generalizing the results of W. Thurston on the combinatorial Mandelbrot set.