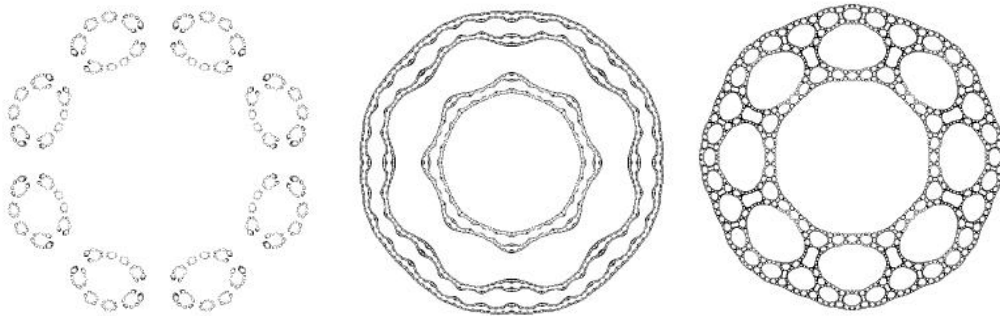


## Singular Perturbations of Complex Rational Maps

Robert L. Devaney

The families of rational maps given by  $z^n + \lambda/z^d$  may be regarded as *singular perturbations* of the very simple function  $z^n$ . When  $\lambda = 0$  we understand everything about the dynamics of the simple map  $z^n$ . But when  $\lambda \neq 0$ , things change dramatically: the Julia sets undergo major explosions, both from a topological as well as a dynamical systems point of view.

In this talk we describe the Escape Trichotomy for this family (i.e., the analogue of the definition of the well known Mandelbrot set). We show that, depending on how the critical orbits escape, there are three very different types of Julia sets: Cantor sets, Sierpinski curves, and Cantor sets of circles.



Some Julia sets for  $z^4 + \lambda/z^4$ : a Cantor set,  
a Cantor set of circles, and a Sierpinski curve.