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COMPLEX ANALYTIC DYNAMICS ON THE RIEMANN SPHERE

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Table of Contents

Holomorphic, noninvertible dynamical systems of the Riemann sphere are surprisingly intricate and beautiful. Often the indecomposable, completely invariant sets are fractals (à la Mandelbrot [M1]) because, in fact, they are quasi-self-similar (see Sullivan [S3] and (8.5)). Sometimes they are nowhere differentiable Jordan curves whose Hausdorff dimension is greater than one (Sullivan [S4] and Ruelle [R]). Yet these sets are determined by a *single* analytic function $z_{n+1} = R(z_n)$ of a *single* complex variable.

The study of this subject began during the First World War. Both P. Fatou and G. Julia independently published a number of *Compte Rendu* notes, and then both wrote long *memoires*—Julia [J] in 1918 and Fatou [F1–F3] in 1919 and 1920. At that time, they had at their disposal a new theorem of Montel (see (4.1)) which gave a sufficient condition for the normality of a family of meromorphic functions. They applied the theory of normal families to the dynamical system to prove some remarkable results.

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