New Trends in Onedimensional Dynamics
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Title: Julia sets and discrete group actions

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Abstract: We discuss the dynamics of complex Hénon maps, which are polynomial automorphisms of $\mathbb{C}^2$. We first look at U^+, the set of points that escape to infinity under forward iterations. Its boundary J^+ is a complicated fractal object on which the Hénon map behaves chaotically. J. Hubbard and R. Oberste-Vorth gave a complete description of the analytic structure of U^+ as a quotient of $(\mathbb{C} - \mathbb{D}) \times \mathbb{C}$ by a discrete group of automorphisms G isomorphic to $\mathbb{Z}[1/d]/\mathbb{Z}$ (where $\mathbb{D}$ is the closed unit disk and d is the degree of the Hénon map). We show how to extend the group action to the boundary and represent the Julia set J^+ as a quotient of $(\mathbb{S}^1 \times \mathbb{C})/G$ by an explicit equivalence relation. We analyze this extension for quadratic Hénon maps that are perturbations of hyperbolic polynomials or polynomials with a parabolic fixed point.

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