Publicacions més rellevants de la línia de recerca:

Dinàmica complexa

Referència: Fagella, N., Jarque X., Taixés, J. On connectivity of Julia sets of transcendental meromorphic maps and weakly repelling fixed points I. *Proceedings of the London Mathematical Society*, **97(3)** (2008), pp 599–622.

Abstract: It is known that the Julia set of the Newton method of a non-constant polynomial is connected (Mitsuhiro Shishikura, Preprint, 1990, M/90/37, Inst. Hautes Ž Etudes Sci.). This is, in fact, a consequence of a much more general result that establishes the relationship between simple connectivity of Fatou components of rational maps and fixed points which are repelling or parabolic with multiplier 1. In this paper we study Fatou components of transcendental meromorphic functions; that is, we show the existence of such fixed points, provided that immediate attractive basins or preperiodic components are multiply connected.

Referència: X. Buff, N. Fagella, L. Geyer, C. Henriksen Herman rings and Arnold disks. *Journal the London Mathematical Society*, **72(3)** (2005), pp. 689–716.

Abstract: For $(\lambda, a) \in \mathbb{C}^* \times \mathbb{C}$, let $f_{\lambda,a}$ be the rational map defined by

$$f_{\lambda,a}(z) = \lambda z^2 \frac{az+1}{z+a}.$$

If $\alpha \in \mathbb{R}/\mathbb{Z}$ is a Bruno number, we let $\mathcal{D}_\alpha$ be the set of parameters (λ, a) such that $f_{\lambda,a}$ has a fixed Herman ring with rotation number α (we consider that $(e^{2i\pi\alpha}, 0) \in \mathcal{D}_\alpha$). The results imply that for any $g \in \mathcal{D}_\alpha$ the connected component of $\mathcal{D}_\alpha \cap (\mathbb{C}^* \times (\mathbb{C} \setminus \{0,1\}))$ which contains g is isomorphic to a punctured disk.

In this article, we show that there is an isomorphism $\mathcal{F}_\alpha : \mathbb{D} \to \mathcal{D}_\alpha$ such that

$$\mathcal{F}_\alpha(0) = (e^{2i\pi\alpha}, 0) \quad \text{and} \quad \mathcal{F}'_\alpha(0) = (0, r_\alpha),$$

where r_α is the conformal radius at 0 of the Siegel disk of the quadratic polynomial $z \mapsto e^{2i\pi\alpha} z(1+z)$. In particular, $\mathcal{D}_\alpha$ is a Riemann surface isomorphic to the unit disk.

As a consequence, we show that for $a \in (0, 1/3)$, if $f_{\lambda,a}$ has a fixed Herman ring with rotation number α and if m_a is the modulus of the Herman ring, then, as $a \to 0$, we have

$$e^{\pi m_a} = \frac{r_\alpha}{a} + \mathcal{O}(a).$$

We finally explain how to adapt the results to the complex standard family $z \mapsto \lambda z e^{\frac{a}{2}(z-1/z)}$.

Referència: Devaney R.L. , Garijo. A. Julia Sets Converging to the Unit Disk. *Proceedings of the American Mathematical Society*, **136(3)** (2008), pp. 981–988.

Abstract: We consider the family of rational maps $F_\lambda(z) = z^n + \lambda/z^d$, where $n, d \geq 2$ and λ is small. If λ is equal to 0, the limiting map is $F_0(z) = z^n$ and the Julia set is the unit circle. We investigate the behavior of the Julia sets of F_λ when λ tends to 0, obtaining two very different cases depending on n and d. The first case occurs when $n = d = 2$; here the Julia sets of F_λ converge as sets to the closed unit disk. In the second case, when one of n or d is larger than 2, there is always an annulus of some fixed size in the complement of the Julia set, no matter how small $|\lambda|$ is.
