Publicacions més rellevants de la línia de recerca:
Aplicacions quasiconformes

Referència: Astala, K., Clop, A., Mateu, J., Orobitg, J. and Uriarte-Tuero, I. Distortion of Hausdorff measures and improved Painlevé removability for quasiregular mappings. *Duke Math. J.*, **141(3)** (2008), pp. 539–571.

Abstract: The classical Painlevé theorem tells that sets of zero length are removable for bounded analytic functions, while (some) sets of positive length are not. For general K-quasiregular mappings in planar domains the corresponding critical dimension is $\frac{2}{K+1}$. We show that when $K > 1$, unexpectedly one has improved removability. More precisely, we prove that sets E of σ-finite Hausdorff $\frac{2}{K+1}$-measure are removable for bounded K-quasiregular mappings. On the other hand, $\dim(E) = \frac{2}{K+1}$ is not enough to guarantee this property.

We also study absolute continuity properties of pull-backs of Hausdorff measures under K-quasiconformal mappings, in particular at the relevant dimensions 1 and $\frac{2}{K+1}$. For general Hausdorff measures $\mathcal{H}^t$, $0 < t < 2$, we reduce the absolute continuity properties to an open question on conformal mappings, see Conjecture 2.3.

Referència: Clop, A., Faraco, D., Mateu, J., Orobitg, J. and Zhong, X. Beltrami equations with coefficient in the Sobolev space $W^{1,p}$. *Publ. Mat.*, **53(1)** (2009), pp. 197–230.

Abstract: We study the removable singularities for solutions to the Beltrami equation $\bar{\partial} f\mu = \partial f$, where μ is a bounded function, $\|\mu\|_\infty \leq \dfrac{K-1}{K+1} < 1$, and such that $\mu \in W^{1,p}$ for some $p \leq 2$. Our results are based on an extended version of the well known Weyl's lemma, asserting that distributional solutions are actually true solutions. Our main result is that quasiconformal mappings with compactly supported Beltrami coefficient $\mu \in W^{1,p}$, $\dfrac{2K^2}{K^2+1} < p \leq 2$, preserve compact sets of σ-finite length and vanishing analytic capacity, even though they need not be bilipschitz.

Referència: Mateu, J., Orobitg, J. and Verdera, J. Extra cancellation of even Calderón-Zygmund

operators and quasiconformal mappings. *J. Math. Pures Appl. (9)*, **91(4)** (2009), pp. 402–431.

Abstract: In this paper we discuss a special class of Beltrami coefficients whose associated quasiconformal mapping is bilipschitz. These are of the form $f(z)\chi_\Omega(z)$, where Ω is a bounded domain with boundary of class $C^{1+\varepsilon}$ and f a function in $\mathrm{Lip}(\varepsilon,\Omega)$ satisfying $\|f\|_\infty < 1$. An important point is that there is no restriction whatsoever on the $\mathrm{Lip}(\varepsilon,\Omega)$ norm of f besides the requirement on Beltrami coefficients that the supremum norm be less than 1. The crucial fact in the proof is the extra cancellation enjoyed by even homogeneous Calderón-Zygmund kernels, namely that they have zero integral on half the unit ball. This property is expressed in a particularly suggestive way and is shown to have far reaching consequences.

An application to a Lipschitz regularity result for solutions of second order elliptic equations in divergence form in the plane is presented.