

CMM PDE Seminar

Speaker: Nicolò Forcillo (University of Rome Tor Vergata, Italy)

Title: Lipschitz regularity of almost minimizers for a degenerate one-phase Bernoulli-type functional.

Abstract: In this talk, we deal with almost minimizers for the energy functional

$$Jp(u, \Omega) := \int_{\Omega} (|\nabla u(x)|^p + \chi_{\{u > 0\}}(x)) dx, p > 1, (1)$$

where Ω is a bounded domain in $\mathbb{R}^n$ and $u \geq 0$. The functional Jp is a generalization to each $p > 1$ of the classical one-phase (Bernoulli) energy functional, corresponding to $p=2$ in (1). Almost minimizers of $J2$ were investigated recently in [2, 1]. However, in [4] D. De Silva and O. Savin provided a different approach with respect to [2, 1], based on nonvariational techniques, to deal with almost minimizers of $J2$ and their free boundaries. Precisely, inspired by [5], they showed that almost minimizers of $J2$ are “viscosity solutions” in a more general sense. This property roughly means that almost minimizers satisfy comparison in a neighborhood of a touching point whose size depends on the properties of the test functions. Once this property was established, the regularity of the free boundary for almost minimizers followed via the techniques developed by De Silva in [3].

In this talk, we present an optimal Lipschitz continuity result for almost minimizers of Jp , $p > \max\{2n/(n+2), 1\}$. Our approach is inspired by the method introduced in [4]. The talk is based on a joint work with S. Dipierro, F. Ferrari, and E. Valdinoci, see [6].

References

- [1] G. David, M. Engelstein, and T. Toro. Free Boundary Regularity for Almost-Minimizers. Adv. Math., 350: 1109–1192, 2019.
- [2] G. David and T. Toro. Regularity of almost minimizers with free boundary. Calc. Var. Partial Differential Equations, 54: 455–524, 2015.
- [3] D. De Silva. Free boundary regularity for a problem with right hand side. Interfaces and free boundaries, 13: 223–238, 2011.
- [4] D. De Silva and O. Savin. Almost minimizers of the one-phase free boundary problem. Comm. Partial Differential Equations, 45 (8): 913–930, 2020.
- [5] D. De Silva and O. Savin. Quasi-Harnack inequality. Amer. J. Math., 143 (1): 307–331, 2021.

[6] S. Dipierro, F. Ferrari, N. Forcillo, and E. Valdinoci. Lipschitz regularity of almost minimizers in one-phase problems driven by the p-Laplace operator. To appear in Indiana University Mathematics Journal, arXiv:2206.03238.

Venue: Online via Zoom / Sala de Seminarios, 5th floor, Beauchef 851

Chair: Rayssa Caju

Monday, May 15, 2023 at 12 Santiago time

El link para asistir de manera virtual:

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