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Interior Regularity Results for Zero-TH Order Operators Approaching the Fractional Laplacian

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In this lecture we going to talk about interior regularity results for the solution $u_\epsilon \in C(\bar{\Omega})$ of the Dirichlet problem

$$\begin{cases} -\mathcal{I}_\epsilon(u) = & f_\epsilon \qquad \text{in } \Omega \\ \qquad u = & 0 \qquad \text{in } \Omega^c. \end{cases} \tag{0.1}$$

where $-\mathcal{I}_\epsilon$ is an approximation of the well-known fractional Laplacian of order σ,as ϵ tends to zero. The purpose of this talk is to understand how the interior regularity of u_ϵ evolves as ϵ approaches zero. We going to present recent results which provide that u_ϵ has a modulus of continuity which depends on the modulus of f_ϵ, which becomes the expected Hölder profile for fractional problems, as $\epsilon \to 0$. This analysis includes the case when f_ϵ deteriorates its modulus of continuity as $\epsilon \to 0$.

Joint work with P. Felmer (CMM-UC) and E. Topp (USACH).

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