Stability of complement value problems for p-Lévy operators

Guy Foghem (Dresden)

We study the well-posedness of nonlocal nonlinear complement value problems on domains governed by symmetric nonlinear integrodifferential p-Lévy operators. A prototypical example of integrodifferential p-Lévy operators is the well-known fractional p-Laplace operator $(-\Delta)^s_p$. To achieve our goal, we shall study associated nonlocal Sobolev-like spaces generated by symmetric p-Lévy integrable kernels. These spaces generalize classical Sobolev spaces of fractional order and are tailored for the study of a large class of nonlinear integro-differential equations (IDEs). Asymptotically, we show that the local nonlinear Dirichlet and Neumann boundary value problems associated with p-Laplacian $-\Delta_p$ are strong limits of the nonlocal ones. We reach this conclusion by establishing important results such as robust Poincaré type inequalities and Gamma convergence of the nonlocal nonlinear energies forms involved to the local ones.

Reference: https://arxiv.org/abs/2303.03776.