

Title: Nonlocal models related problems

Abstract: In this talk we present two different problems from the nonlocal world. The first one is a problem of interpolation of certain weighted Sobolev spaces [1] in connection with some regularity results for the fractional Laplace operator given [2]. In particular we characterize the real interpolation space

$$(L^p(\Omega), W^{1,p}(\Omega, 1, d^p))_{s,p},$$

for *arbitrary* bounded domains. The second one is about couplings between local and nonlocal operators. In [3, 4] we propose a natural energy formulation leading to several coupling models for which existence and uniqueness of solutions is shown. The basic technique is that of the direct method of the calculus of variations, nonetheless we also show that a natural Schwarz iterative procedure gives an alternative approach for both the analytical and the numerical treatment of these problems.

REFERENCES

- [1] Acosta G.; Drelichman, I.; Durán, R. G. *Weighted fractional Sobolev spaces as interpolation spaces in bounded domains*, <https://arxiv.org/pdf/2112.03416.pdf>.
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- [3] Acosta G.; Bersetche F.; Rossi J., *Local and nonlocal energy-based couplings models*, to appear in SIAM J. Math. Anal. <https://arxiv.org/pdf/2107.05083.pdf>
- [4] Acosta G.; Bersetche F.; Rossi J., *Coupling local and nonlocal equations with Neumann boundary conditions.*, to appear in Rev. de la Union Matematica Argentina, <https://arxiv.org/pdf/2112.00120.pdf>