Regularization in Sobolev Spaces with Fractional Order

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Abstract: We study the minimization of a quadratic functional subject to a nonlinear elliptic PDE where the Tichonov regularization term is given in H^s with a fractional parameter $s > 0$. Moreover, pointwise control constraints are given. In order to allow a numerical treatment of this problem we introduce a multilevel approach as an equivalent norm concept. Furthermore, the existence of regular Lagrange multipliers can be shown.

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