On a Mixed $p-$Laplacian and Fractional Laplacian Problem

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We investigate the existence, uniqueness and continuous dependence on parameters for a class of mixed local–nonlocal Dirichlet boundary value problems driven by the $p-$Laplacian and the fractional Laplacian. The nonlinear term is allowed to depend on both the unknown function and its gradient, which makes the problem non-variational and prevents the direct application of critical point methods. Our approach is based on the theory of monotone and pseudomonotone operators together with the Browder–Minty theorem and surjectivity results for coercive pseudomonotone mappings. The paper extends the corresponding theory for mixed local–nonlocal problems involving the classical Laplacian to the quasilinear setting generated by the $p-$Laplacian.

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