

# POINTWISE AND FREE BOUNDARY APPROXIMATION OF THE OBSTACLE PROBLEM FOR NONLOCAL OPERATORS

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**ABSTRACT.** We develop a monotone, two-scale discretization for a class of elliptic integrodifferential operators of order  $2s$ , like the integral fractional Laplacian of order  $s \in (0, 1)$ . This discretization naturally leads to max-norm error estimates for linear problems. We extend these to the obstacle problem and indicate how, from these, free boundary estimates can be obtained, provided a nondegeneracy condition takes place. As an application of this result, we obtain convergent numerical approximations of a class of fully nonlinear, convex, integrodifferential operators.

**Keywords:** Integrodifferential operators; Monotonicity; Obstacle problems; Fully nonlinear nonlocal equations; Rate of convergence.

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