

Coupling Local and Nonlocal Models

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Nonlocal integral-differential equations and nonlocal balance laws have been proposed as effective continuum models in place of PDEs for a number of anomalous and singular processes. They may also be used to bridge multi-scale models, since nonlocality is often a generic feature of model reduction. We discuss a possible variational formulation for the seamless coupling of some local (PDEs) and nonlocal models. At the heart of the formulation is a new trace theorem that extends the classical counterpart for Sobolev spaces to nonlocal spaces containing functions with possible singularities away from the boundary.