

We discuss mathematical and computational issues related to some nonlocal balance laws and in particular the peridynamic models. A vector calculus for nonlocal operators [3] is presented which provides a rigorous foundation to pose abstract nonlocal balance laws with reduced regularity requirements. We address some basic well-posedness issues and explore the connections with local models [1,2,4,7,8,9]. We also address questions concerning finite dimensional approximations of such nonlocal models, such as convergence, a priori and a posteriori error analysis and conditioning of nonlocal stiffness matrices [2,4,5,6].

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