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Marta D’Elia* (mdelia@sandia.gov), **Christian Vollmann** (vollmann@uni-trier.de) and **Max Gunzburger** (mgunzburger@fsu.edu). *Nonlocal models with approximate nonlocal neighborhoods: towards fast nonlocal FEM.*

Numerical solution of nonlocal models via FEM in 2 or 3D can be prohibitively expensive. This is due to the fact that points in a domain interact with a neighborhood of points. Standard neighborhoods are Euclidean balls; this creates computational challenges in terms of assembling and accuracy of FE matrices. We propose approximate neighborhoods that make the assembling process easier and faster. We analyze the new discretized nonlocal equation and present numerical results. (Received September 03, 2019)