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**Tadele Mengesha\*** ([mengesha@math.psu.edu](mailto:mengesha@math.psu.edu)), Department of Mathematics, Penn State University, University Park, PA 16802, and **Qiang Du**. *Mathematical Analysis of linear peridynamics*.

We analyze the linear bond-based peridynamic model of continuum mechanics. The focus is on models of isotropic elastic materials that allow an indefinite micromodulus kernel. Using standard variational techniques we prove the well posedness of the system of equilibrium equations, given as a nonlocal boundary value problem. We will also study the Cauchy problem of the time dependent equations of motion. In the event of vanishing nonlocality solutions of the nonlocal system are shown to converge to the Navier system of classical elasticity. Our analysis is based on some nonlocal Poincaré-type inequalities and compactness of the corresponding nonlocal operators. (Received September 24, 2012)