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Rich Lehoucq* (rblehou@sandia.gov), Po box 5800, Albuquerque, NM 87185. *The Peridynamic Nonlocal Continuum Theory.*

My talk introduces the nonlocal balances of momentum and energy. The nonlocal force and energy densities are given by integral operators that are the nonlocal analogues for the classical force and energy densities. The integral operators sum forces and power expenditures among volumes separated by a finite distance and so represent nonlocal interaction. This is in contrast to the classical densities in which interaction only occurs between volumes in direct contact—the interaction is therefore deemed local. The integral operators obviate special treatment at points of discontinuity conventionally employed because spatial derivatives are avoided. The resulting balance laws extend the classical theory of continuum mechanics to allow for discontinuities. (Received September 21, 2012)