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Stewart A Silling* (sasilli@sandia.gov). *Multiscale and Coarse Graining Methods in Peridynamic Mechanics.*

The peridynamic method of solid mechanics is a strongly nonlocal continuum theory that allows potentially great generality in the modeling of defects and material failure. This talk will describe recent advances in the development of a hierarchical multiscale approach in peridynamics that enables the exploration of the transition of small-scale material defect growth to macroscopic failure. Applications of the method include three-dimensional simulation of fractographic features in dynamic brittle fracture, such as the mirror-mist-hackle phenomenon. A coarse-graining method permits accurate derivation of larger-scale material properties from arbitrary small-scale morphology. Possible application to metamaterials will be discussed. (Received September 21, 2015)