



Uncertainty Quantification in Materials Modeling

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Uncertainty is ubiquitous in nature. In materials modeling, uncertainty can arise from many sources, including constitutive relations, material microstructure, and source terms, as well as boundary and/or initial conditions. In this presentation, we will provide an overview of uncertainty quantification (UQ) for materials modeling, with application examples from fracture mechanics. We will review the peridynamics theory of solid mechanics, a nonlocal reformulation of classical continuum mechanics suitable for material failure and damage simulation, and we will demonstrate the application of UQ methodologies to various peridynamic problems of interest, including crack propagation in glass, fiber-reinforced composites, and ceramics.