

Towards Multiscale Materials Modeling with Peridynamics

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Abstract:

The peridynamic model is a nonlocal reformulation of continuum mechanics based on integral equations. It assumes points in a continuum separated by a finite distance may interact directly. This nonlocal interaction induces length scales, which can be controlled for multiscale modeling. In particular, recent efforts have demonstrated peridynamics as an upscaling of molecular dynamics. Further, classical elasticity has been established as a limiting case of a peridynamic model. I will survey the analytical, numerical, and computational connections between molecular dynamics, peridynamics, and classical continuum mechanics, motivating peridynamics as a multiscale material model.

Dr. Parks has obtained his Ph.D. in Computer Science from the University of Illinois at Urbana-Champaign in 2005. He holds a M.S. degree in Computer Science from Virginia Tech (2000), and a double B.S. degree in Physics and in Computer Science also from Virginia Tech (1998).