

A peridynamic analysis of the role of elastic waves in controlling dynamic brittle fracture

Florin Bobaru

Department of Mechanical and Materials Engineering
University of Nebraska-Lincoln

In this talk I will explain reasons for why peridynamics is capable of predicting the crack propagation speed measured in experiments on brittle fracture and comment on the role of elastic stress waves in controlling the speed and path of a propagating crack. I will show examples for both isotropic and anisotropic (fiber-reinforced composites) cases [1,2]. In the case of fiber-reinforced composites, intersonic crack propagation speeds are observed in mode II dynamic cracks. These cracks are splitting cracks that grow along the fiber direction.

References

- [1] F. Bobaru and W. Hu, "The meaning, selection, and use of the Peridynamic horizon and its relation to crack branching in brittle materials," *International Journal of Fracture*, Vol. 176, (2012) 215–222.
- [2] W. Hu, YD. Ha, and F. Bobaru, "Peridynamic model for dynamic fracture in unidirectional fiber-reinforced composites," *Computer Methods in Applied Mechanics and Engineering*, Vol. 217–220, (2012) 247–261.