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Modeling Impact Behavior of Glass with Peridynamics[1] S. SATAPATHY, A. DAWSON, S. BLESS, I. POLYZOIS, G. RODIN, The University of Texas at Austin, Institute for Advanced Technology — Glass is being considered for various transparent armor applications due to its high compressive strength. However, its low tensile properties lead to cracks and fractures if significant tensile stresses are present. Presence of surface cracks in combination with high tensile stresses lead to dynamic failure, sometimes in an explosive manner. We have conducted bar impact experiments as well as ballistic tests to study their penetration behavior. Numerical simulation of these experiments is a challenge. The existing hydrocodes do not provide satisfactory results for brittle materials. This can be attributed to significant differences in constitutive behavior between brittle and ductile materials and the need to account for many fracture surfaces. A new numerical method, peridynamics—a meshless Lagrangian method solving the equation of motion in integral form—has been proposed by Stewart Silling that appears to be more suitable for modeling brittle materials. We use this method to examine the response of glass to impact loads in both bar impact and penetration experiments. This paper will discuss advantages and difficulties in modeling glass with peridynamics.

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