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Some Recent Results on Propagation of the Failure Front Associated with Rod Penetration of Borosilicate Glass

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Propagating failure fronts (FF), often termed failure "waves", have been observed for a variety of impact/shock conditions and geometries. An FF is inferred from VISAR particle velocity measurements and longitudinal and transverse stress gage measurements in uniaxial strain (plate impact). Failure fronts are observed optically in uniaxial stress (plate-glass bar impact, bar-bar impact, Taylor impact), Edge-on Impact and 3 dimensional divergent (two-dimensional axial symmetry) rod impact geometries. This paper presents some recent results for the FF associated with rod impacts and penetration of borosilicate glass. Specifically, experiments were performed to address the questions: 1) Does the FF stop propagating after the stress at the rod-glass interface is removed? 2) Can the FF propagation be reinitiated by the impact of a second rod? And, if so, 3) is the propagation velocity the same as for the original FF? The results of these experiments and what they suggest regarding the physical mechanism(s) underlying FFs in glass are presented.