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Failure Wave in DEDF and Soda-Lime Glass During Rod Impact
DENNIS ORPHAL, International Research Assoc., THILO BEHNER, VOLKER HOHLER, Ernst-Mach-Insitut, CHARLES ANDERSON, Southwest Research Institute, DOUGLAS TEMPLETON, US Army TARDEC — Investigations of glass by planar, and classical and symmetric Taylor impact experiments reveal that failure wave velocity U_F depends on impact velocity, geometry, and the type of glass. U_F typically increases with impact velocity to between ∼1.4 C_S and C_L (shear and longitudinal wave velocities, respectively). This paper reports the results of direct high-speed photographic measurements of the failure wave for gold rod impact from 1.2 and 2.0 km/s on DEDF glass (C_S = 2.0, C_L =3.5 km/s). The average rod penetration velocity, u, was measured using flash X-rays. Gold rods eliminated penetrator strength effects. U_F for gold rod impact on DEDF is ∼ 1.0-1.2 km/s, which is considerably less than C_S. The increase of u with impact velocity is greater than that of U_F. These results are confirmed by soda-lime glass impact on a gold rod at an impact velocity of 1300 m/s. Similar results are found in"edge-on-impact" tests; U_F values of 1.4 km/s and 2.4-2.6 km/s in soda-lime glass are reported for W-alloy rod impact, considerably less than C_S (3.2 km/s) [1,2]. [1] Bless, et. al.(1990) AIP Proc. Shock Comp. Cond. Matter—1989, pp. 939-942 (1990) [2] E. L. Zilberbrand, et. al. (1999) Int. J. Impact Engng., 23, 995-1001 (1999).

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