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Confined and Unconfined Alumina Bar-on-Bar Impact Experiments for Improved Material Models N.S. BRAR, Mechanical and Aerospace Engineering and Research Institute, University of Dayton, Dayton, OH 45469, A.M. RAJENDRAN, US Army Research Office, Research Triangle Park, NC 27709 — Unconfined and confined (in steel sleeves) alumina bar-on-bar (1-d stress) experiments are performed to extend uniaxial strain deformation states imposed in flyer plate impact experiments. A number of investigators engaged in modeling the bar-on-bar experiments have varying degrees of success in correctly simulating the measured in-situ axial stress or free surface velocity histories. Axial velocity of the far end of the unconfined and confined AD998 bars was measured using a VISAR in a series of unconfined and confined alumina bar-on-bar impact experiments at impact speeds from 100 m/s to 500 m/s. A high speed camera was used to photograph impactor and target bars during impact. Velocity history data from an unconfined bar-on-bar impact at 100 m/s show the material response as elastic. Velocity history data on unconfined bars at higher impact velocities of 200 m/s and 300 m/s suggest an inelastic material response. Velocity histories from four shots at impact velocities of 203 m/s, (two at) 293 m/s, and 511 m/s on confined alumina bars exhibit inelastic material response. Axial velocity history data on confined and unconfined bars clearly suggest that confinement marginally enhances the compressive strength of alumina in the 1-d impact configuration.

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