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Shock Compression and Release of Metal Foam WARREN MAINES, CHRISTOPHER NEEL, LALIT CHHABILDAS, Air Force Research Laboratory, JOHN BORG, Marquette University, WILLIAM REINHART, Sandia National Laboratories — We report of the results of uniaxial strain experiments and computations to discuss the compressed and isentropic release states of aluminum foam ∼50% relative density undergoing high velocity impact at up to 10GPa. The initial geometry of the foam was obtained via computed x-ray tomography (XCT) and imported directly into the CTH hydrodynamic code. Simulations of the dynamic response of the foam are compared to experimental measurements and used to build macro scale constitutive relations. The experimental results were obtained utilizing a reverse ballistic plate reverberation technique that obtained shock compression states of the foam. In these experiments, 6061-T6 aluminum, oxygen free copper and tantalum were used as standard witness plates and were shocked by the metal foam projectile at up to 2.0 km/s. The response of the witness plates was monitored by three different velocity interferometers positioned at three different locations on the witness plate to obtain compaction and release behavior. The simulations captured the heterogeneous Hugoniot and release state of the foam extremely well. The resulting constitutive relations built from mesoscale simulations compare favorably to those built from experimental results.

John Borg
Marquette University

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