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Fracture of explosively compacted aluminum particles in a cylinder DAVID FROST, JASON LOISEAU, SAM GOROSHIN, McGill University, FAN ZHANG, DRDC Suffield, ALEC MILNE, AARON LONGBOTTOM, Fluid Gravity Engineering Ltd. — The explosive compaction, fracture and dispersal of aluminum particles contained within a cylinder have been investigated experimentally and computationally. The aluminum particles were weakly confined in a cardboard tube and surrounded a central cylindrical burster charge. The compaction and fracture of the particles are visualized with flash radiography and the subsequent fragment dispersal with high-speed photography. The aluminum fragments produced are much larger than the original aluminum particles and similar in shape to those generated from the explosive fracture of a solid aluminum cylinder, suggesting that the shock transmitted into the aluminum compacts the powder to near solid density. The casing of the burster explosive (plastic-, copper-, and un-cased charges were used) had little influence on the fragment size. The effect of an air gap between the burster and the aluminum particles was also investigated. The particle motion inferred from the radiographs is compared with the predictions of a multimaterial hydrocode.

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