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Cylindrical Driven Shocks in Ceria[1] T J VOORHEES, Georgia Institute of Technology, M S FREEMAN, C L ROUSCULP, D A FREDENBURG, J T BRADLEY, P M DONOVAN, FRANK FIERO, J R GRIEGO, J C LAMAR, F G MARIAM, LEVI P NEUKIRCH, D M ORO, A R PATTEN, R B RANDOLPH, W A REASS, R E REINOVSKY, A SAUNDERS, S SJUE, Z TANG, Los Alamos National Laboratory, P J TURCHI, Retired — Shock compression of granular ceria was studied in converging cylindrical geometry using LANL Proton Radiography driven by the PHELIX magnetic implosion system in which a 1 mm thick liner-impactor was accelerated it to 0.8 mm/μs. The impactor launched a shock in the cylindrical Al outer wall of the target assembly containing equiaxed, 63 μm-mean diameter ceria powder initially compacted to a static density of 4 g/cc. The cylindrically converging shock in the ceria was observed with a series of 31 proton-radiographic frames down the axis of the cylinder. Results indicate that significant shock energy was expended in compacting the porous ceria, as the wave velocity markedly decreases during convergence, and a clear shock reflected from the axis was not observed. These observations are inconsistent with pre-shot modeling, and highlight the need for an improved understanding of the physics of compaction under non-ideal loading.

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