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Dynamic Deformation and Fragmentation Response of Maraging Steel Linear Cellular Alloy[1] ADAM JAKUS, D.A. FREDENBURG, T. MCCOY, N.N. THADHANI, J. COCHRAN, Georgia Institute of Technology — The dynamic deformation and fragmentation response of 25% dense 9-cell linear cellular alloy (LCA) made of unaged 250 maraging steel, fabricated using a direct reduction and extrusion technique, is investigated. Explicit finite element simulations were implemented using AUTODYN. The maraging steel properties were defined using a Johnson-Cook strength model with previously validated parameters. Rod-on-anvil impact tests were performed using the 7.6mm helium gas gun and the transient deformation and fragmentation response was recorded with high-speed imaging. For purpose of comparison, the response of 25% dense hollow cylinders of same density as the 9-cell LCA was also studied. Analysis of observed states of specimens and finite element simulations reveal that in the case of the 9-cell LCA, dissipation of stress and strain occurs along the interior cell wells resulting in significant and ubiquitous buckling prior to confined fragmentation. In comparison, the simple hollow cylinder undergoes significant radial lipping, eventually producing larger sized, external fragments.

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Adam Jakus
Georgia Institute of Technology

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