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Modeling and Simulation of the Impact Response of Filled and Unfilled Linear Cellular Alloys for Structural Energetic Material Applications ADAM JAKUS, ANTHONY FREDENBURG, NARESH THADHANI, Georgia Institute of Technology — We are investigating the mechanics of impact-induced stress transfer between a linear cellular alloy (LCA) and a reactive filler to determine the effect of cell geometry on deformation and fragmentation. LCAs are honeycomb structures made of maraging steel, and provide structural integrity for the reactive filler such as a powder mixture of Ta+Fe_2O_3. 3-D computations are used to determine stress and strain distributions in both filled and unfilled LCAs during impact. The strength and failure models used for maraging steel and the response of Ta+Fe_2O_3 are validated through experiment. The failure response of three different geometries: 9-cell, pie, and reinforced pie, are compared with the response of a hollow cylinder, for impact velocities of 100, 200, and 300 m/s. Unfilled, the cylindrical geometry provides the least resistance to deformation and fragmentation, while the reinforced pie LCA provides the most resistance. Understanding of the mechanics of deformation and failure is used to determine the most effective geometry for stress transfer to the filler.

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