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Equation of State of Aluminum – Iron Oxide (Fe_2O_3) – Epoxy Composite: Modeling and Experiment JENNIFER JORDAN, Air Force Research Laboratory, RICHARD DICK, Shocks Unlimited, LOUIS FERRANTI, NARESH THADHANI, School of Materials Science and Engineering, Georgia Institute of Technology, RYAN AUSTIN, DAVID MCDOWELL, School of Mechanical Engineering, Georgia Institute of Technology, DAVID BENSON, Applied Mechanics and Engineering Science, University of California - San Diego — We report on the investigation of the equation of state of an Al – Fe_2O_3 – epoxy composite in the 2-15 GPa pressure range. The composites were prepared by mixing Al and Fe_2O_3 powders with epoxy and curing. The equation of state measurements were conducted using an explosive loading technique with piezoelectric pins to measure the shock velocity in the sample and in a donor material. Gas gun experiments were also preformed on the same materials at lower pressures, using PVDF stress gauges to record the input and propagated stress values and shock velocity based on time of travel through the sample thickness. The experimental results presented in the form of pressure versus volume and shock velocity versus particle velocity relation, are compared to mesoscale particle system eulerian finite element simulations and good agreement is achieved.

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