Abstract Submitted
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Modeling the Shock Hugoniot in Porous Materials KYLE R. COCHRANE, LUKE SHULENBURGER, THOMAS R. MATTSSON, J. MATTHEW D. LANE, PHILIPPE F. WECK, TRACY J. VOGLER, MICHAEL P. DESJARLAIS, Sandia National Laboratories — Porous materials are present in many scenarios from planetary science to ICF. Understanding how porosity modifies the behavior of the shock Hugoniot in an equation of state is key to being able to predictively simulate experiments. For example, modeling shocks in under-dense iron oxide can aid in understanding planetary formation and silica aerogel can be used to approximate the shock response of deuterium. Simulating the shock response of porous materials presents a variety of theoretical challenges, but by combining ab initio calculations with a surface energy and porosity model, we are able to accurately represent the shock Hugoniot. Finally, we show that this new approach can be used to calculate the Hugoniot of porous materials using existing tabular equations of state. Sandia National Laboratories is a multi-mission laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energys National Nuclear Security Administration under contract DE-AC04-94AL85000.

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