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Implementation of a complex multi-phase equation of state for cerium and its correlation with experiment FRANK J. CHERNE, BRIAN J. JENSEN, Los Alamos National Laboratory, VYACHESLAV M. ELKIN, Russian Federal Nuclear Center–All-Russia Research Institute of Theoretical Physics (RFNC-VNIITF) — The complexity of cerium combined with its interesting material properties makes it a desirable material to dynamically examine. Characteristics such as the softening of the material before the phase change, low pressure solid-solid phase change, predicted low pressure melt boundary, and the solid-solid critical point add an additional puzzle to the construction of an equation of state for the material. Currently, we are incorporating a feedback loop between a theoretical understanding of the material and an experimental understanding. We have performed a number of experiments using front surface impact (cerium impacting a plated window) and normal geometry (i.e. known material impacting cerium-windowed and unwindowed). The front surface impact experiments show that there is a rarefactions shock upon release. The release states appear to occur at different magnitudes, thus allowing us to plot out the γ-α phase boundary. The dynamic melt boundary will also be discussed. Support for this work was done under US DOE contract DE-AC52-06NA25396.

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