Abstract Submitted
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Recent advances in modeling Hugoniots with Cheetah KURT GLAESEMANN, LAURENCE FRIED, Lawrence Livermore National Laboratory — The detonation of an energetic material is the result of a complex interaction between kinetic chemical reactions and thermodynamic chemical equilibrium. Unfortunately, little is known concerning the detailed chemical kinetics of reacting energetic materials. Cheetah uses rate laws to treat species with the slowest chemical reactions, while assuming other chemical species are in equilibrium. Cheetah supports a wide range of elements and condensed detonation products and can also be applied to gas phase reactions. Improvements have been made to Cheetah's equilibrium solver, that allow it to find a wider range of thermodynamic states. Many of the difficulties experienced by users in earlier versions of Cheetah have been fixed. New capabilities have also been added. The ultimate result is a code that can be applied to a wide range of shock problems involving both energetic and non-energetic materials. New experimental validations of Cheetah's equation of state methodology have been performed, including both reacted and unreacted Hugoniots. This work was performed under the auspices of the U.S. Department of Energy by the University of California Lawrence Livermore National Laboratory under contract No. W-7405-Eng-48.

Laurence Fried
Lawrence Livermore National Laboratory

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