Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Machine Learning for Classifying Hydrodynamic Breakdown in HED Plasmas AUSTIN GILBERT, Michigan State University, Los Alamos National Lab, JEFF HAACK, Los Alamos National Lab — Correct prediction of shock width is important for evaluating atomic mixing in high energy density plasma experiments, e.g. shell-fuel mixing in inertial confinement fusion capsules. In this study we use machine learning to attempt to identify when 1d fluid descriptions of a multi species plasma reminiscent of a capsule interface fail to adequately describe a standing shock, and determine when a kinetic description is appropriate. We compare the effectiveness of various combinations of several different metrics for non-equilibrium behavior, such as shock width, species mixing, temperature anisotropy, Knudsen numbers, and deviations from Maxwellian distributions between a fluid and kinetic model to efficiently train a perceptron identify the breakdown regime.

Austin Gilbert
Michigan State Univ

Date submitted: 02 Jul 2019 Electronic form version 1.4