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Dynamically stable implosions in a large simulation dataset[1]
J. LUC PETERSON, JOHN FIELD, Lawrence Livermore National Laboratory, KELLI HUMBIRD, Lawrence Livermore National Laboratory, Texas AM University, SCOTT BRANDON, STEVE LANGER, RYAN NORA, BRIAN SPEARS, Lawrence Livermore National Laboratory — Asymmetric implosion drive can severely impact the performance of inertial confinement fusion capsules. In particular the time-varying radiation environment produced in near-vacuum hohlraum experiments at the National Ignition Facility is thought to limit the conversion efficiency of shell kinetic energy into hotspot internal energy. To investigate the role of dynamic asymmetries in implosion behavior we have created a large database of 2D capsule implosions of varying drive amplitude, drive asymmetry and capsule gas fill that spans 13 dimensions and consists of over 60,000 individual simulations. A novel in-transit analysis scheme allowed for the real-time processing of petabytes of raw data into hundreds of terabytes of physical metrics and synthetic images, and supervised learning algorithms identified regions of parameter space that robustly produce high yield. We will discuss the first results from this dataset and explore the dynamics of implosions that produce significant yield under asymmetric drives.

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