Abstract Submitted
for the DPP05 Meeting of
The American Physical Society

Integrated Modeling of Short-Pulse Laser-Plasma Experiments

R.P.J. TOWN, M. CHEN, H. CHUNG, L.A. COTTRILL, M. FOORD, S.P. HATCHETT, M.H. KEY, A.B. LANGDON, B.F. LASINSKI, S. LUND, A.J. MACKINNON, B.C. MCCANDLESS, H.S. PARK, P.K. PATEL, B.A. REMINGTON, R.A. SNAVELY, W.L. SHARP, C.H. STILL, M. TABAK, Lawrence Livermore National Laboratory, D.R. WELCH, Mission Research Corp. — Modeling high energy density physics applications driven by short-pulse lasers requires the integration of many areas of physics that operate on disparate spatial and temporal scales. To perform such modeling in one integrated code would be computationally prohibitive, therefore we use the python scripting language to couple together independent hydrodynamics, explicit particle-in-cell (PIC) (Z3), implicit hybrid PIC (LSP), and atomic physics codes (FLYCHK) into one virtual code. This paper will briefly review the integration methodology and outline the new physics packages that have recently been added to LSP. We will contrast our simulation approach with those pursued by other researchers. We will present integrated simulation results of recent Petawatt Kα radiography, electron transport, and isochoric heating experiments and show predictions of a proof-of-principle NIF fast ignition experiment. 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.

R. P. J. Town
Lawrence Livermore National Laboratory

Date submitted: 19 Jul 2005

Electronic form version 1.4