Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Kinetic saturation of stimulated Raman scattering in a fluid code[1]

E.S. DODD, B. BEZZERIDES, D.F. DUBOIS, H.X. VU, LANL — We have implemented a saturation model for backward stimulated Raman scattering (BSRS) based on kinetic nonlinearity of the driven Langmuir waves into pF3d. The parametric coupling of BSRS leads to a daughter Langmuir wave (LW) whose wave number $k\lambda_D$ depends on plasma conditions and determines the level of LW dissipation via Landau damping. It is accepted that more strongly damped waves lead to a reduced BSRS response, which was the motivation for shorter wavelength laser drivers in ICF. However, an increase in $k\lambda_D$ increases the likelihood of electron trapping in the LW. Trapped particles in a wave change the character of Landau damping, causing the damping to decrease with time, and also leading to a time-dependent frequency shift. This decrement in Landau damping leads to an inflation of BSRS levels beyond those predicted by linear convective theory, and has been observed in previous RPIC simulations and in experiments. A model for inflated BSRS was recently developed and tested in a 1-d fluid-type three-wave code to reproduce RPIC simulations with a rapid rise of BSRS levels by orders of magnitude with a small change in incident intensity. This work is extended to 3-d by adding the trapping physics model to pF3d. We will show results from using the modified pF3d code to examine SRS issues at NIF relevant conditions.

[1]Supported under the U. S. D. O. E. by the Los Alamos National Laboratory, LANS LLC under contract DE-AC52-06NA25396.

Evan Dodd
Los Alamos National Laboratory

Date submitted: 24 Jul 2006

Electronic form version 1.4