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Multidimensional non local effects in hot spot relaxation in laser-produced plasmas P.H. NICOLAI, J.L. FEUGEAS, X. RIBEYRE, M. GRECH, G. SCHURTZ, CELIA, University Bordeaux 1, Talence, France — The control of parametric instabilities, such as filamentation and stimulated scattering is a necessity for the Inertial Confinement Fusion (ICF). The plasma temperature and density distribution directly affect the laser beam propagation and the energy deposition. Under sharp gradients created by non-uniform laser heating, the size of hot spots is often comparable to the electron mean free path and the electron heat transport becomes nonlocal. Furthermore, the hot spot form is not necessarily spherical and a one dimensional analysis is insufficient. This work presents the multi-dimensional effects of the non local electron transport on the plasma response induced by a single hot spot or multi hot spots. In addition, in non spherical speckles, we show that crossed gradients of density and temperature generate vortical flows and magnetic fields. These self generated magnetic fields combined with nonlocal heat transport effects [Ph. Nicolai et al Phys. PLasmas **13**, 032701 (2006)] could strongly change the life time of hot spots. Thanks to the use of a 2D multi-physics hydrodynamic code, we investigate the LIL facility quadruplet conditions for long time periods and large plasma conditions [the LIL facility is a full scale bundle of 4 Laser Mega Joule (LMJ) beams]. It appears that in a realistic case, our model indicates a dramatic change of the temperature and density distributions.

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