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O3.205 Modeling of laser-plasma interaction in the shock ignition regime with LPSE: Comparison with particle in-cell simulations and experiments

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The shock ignition (SI) approach to inertial confinement fusion promises ignition at a lower laser energy than conventional hotspot schemes. The target is initially driven at a low-implosion velocity, which reduces hydrodynamic instabilities, and then ignited by a high-intensity spikethat launches a strong shock into the hot spot. The high-intensity spike, however, can trigger laser-plasma instabilities (LPIs) that generate hot electrons, which migth pose a serious preheat threat to the capsule (preheating) or rather contribute to increase the shock pressure, depending on their energy. Here, we present LPSE simulations studying LPIs for parameters relevant to SI.By employing time-enveloping and a fluid plasma response, LPSE models scales intermediate to hydrodynamics and kinetics and has a lower numerical noise than particle-in-cell (PIC) codes,making it particularly suited for studying LPI processes in the plasma corona. Comparison of LPSE simulations, including stimulated Raman scattering (SRS) and stimulated Brillouin scattering (SBS) for parameters relevant to OMEGA EP experiments are performed: in particular, prediction on SRS and SBS time-averaged reflectivities and Raman spectrum obtained in LPSE simulations show a good agreement with PIC results[1].

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References
[1] O. Klimo and V.T. Tikhonchuk, Plasma Phys. Control. Fusion 56 055010 (2014)

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