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Energy Transfer between Laser Beams by Stimulated Brillouin Scattering in Plasmas[1] K.A. HUMPHREY, D.C. SPEIRS, K. RONALD, A.D.R. PHELPS, S.L. MCCONVILLE, University of Strathclyde, F. FIUZA, L. SILVA, Instituto Superior Técnico, R. CAIRNS, I. VORGUL, University of St. Andrews, R.M.G.M. TRINES, P. NORREYS, R. BINGHAM, STFC Rutherford Appleton Laboratory — Energy exchange between crossing laser beams in a plasma is of particular interest for indirect drive inertial confinement fusion. In order to ensure uniform compression of the fuel capsule it is essential that the laser beams incident on the hohlraum deliver symmetrical irradiation and heating to the pellet to mitigate the possibility of the capsule prematurely breaking apart before the fusion process takes place. One mechanism which can be exploited to ensure uniform spherical compression of the target is stimulated Brillouin scattering whereby the laser energy from adjacent beams can be transferred from one to the other to deliver a tuneable mechanism by which laser energy can be redistributed to specific areas of the target. Brillouin scattering is a parametric instability and takes the form of a three-wave interaction via the scattering of a high frequency transverse wave by a low frequency ion-acoustic wave into a different transverse wave. As the frequency of the ion acoustic wave is typically much lower than the laser frequency a large fraction of the energy can be transferred between the laser beams. Numerical simulations of the laser-plasma dynamics associated with this stimulated energy transfer process will be presented and discussed.

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