LASER PROPAGATION UNDER STIMULATED RAMAN INSTABILITY IN A PLASMA WITH HOT DRIFTING ELECTRONS

D. N. Gupta, P. Yadav. K. Avinash
Department of Physics and Astrophysics,
University of Delhi, Delhi 110 007, India
E-mail: dngupta@physics.du.ac.in

Stimulated Raman scattering may be crucial in the inertial confinement fusion process as the scattered electromagnetic wave decreases the laser-plasma coupling, and can affect the irradiation symmetry. Also, the plasma waves can accelerate the electrons that can heat the fusion fuel. In the field of laser-plasma interactions, hot energetic electrons have been a concern for research for a long time. In common plasmas, these energetic electrons are generated by the damping of plasma waves excited by the laser. Most laser-driven fusion processes observed these laser-heated energetic electrons as a pre-heater which pre-heats the target and affects the fuel compression. We explore the study of SRS of a laser by including the effect of energetic electrons generated during laser-plasma interactions, where the growth of interacting waves during the Raman scattering process is analyzed. The Langmuir wave and scattered electromagnetic sideband wave grow initially, and dump after attaining a maximum level that shows a periodic exchange of energy between the pump wave and the daughter waves. The presence of drifting energetic electrons in laser produced plasma influences the stimulated Raman scattering process. The plasma wave generated by Raman scattering may be influenced due to the presence of the energetic electrons, which enhances the growth rate of the instability. Our results show that the presence of energetic drifting electrons in the plasma is shown to have an important effect on the evolution of the interacting waves. This phenomenon is modelled via two-dimensional particle-in-cell simulations of the propagation and interaction of the laser under Raman instability.

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