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Suppression of stimulated Raman scattering due to localization of electron plasma wave in laser beam filaments PRERANA SHARMA, RAMPAL SHARMA, Indian Institute of Technology, Delhi, India — The filamentation of the high power laser beam by taking off-axial contribution is investigated when ponderomotive nonlinearity is taken into account. The splitted profile of the laser beam is obtained due to uneven focusing of the off-axial rays. It is observed that the weak electron plasma wave (EPW) propagating in the z direction is nonlinearly coupled in the modified filamentary regions of the laser beam. The semi-analytical solution of the nonlinear coupled EPW equation in the presence of laser beam filaments has been found and it is observed that the nonlinear coupling between these two waves leads to localization of the EPW. Stimulated Raman scattering (SRS) of this EPW is studied and back reflectivity has been calculated. Further, the localization of EPW affects the eigen frequency and damping of plasma wave. As a result of this, mismatch and modified enhanced Landau damping lead to the disruption of SRS process and a substantial reduction in the back reflectivity. For the typical laser beam and plasma parameters with wavelength (λ=1064nm), power flux ($\approx 10^{16}$W cm^{-2}), and plasma density (n/n_{cr}) = 0.2; the back reflectivity was found to be suppressed by a factor of around 20%.

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