The propagation of the rippled laser beam and the excitation of electron plasma wave for different densities of plasma based on nonlinear effects

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Abstract
In this paper the propagation characteristics of the gaussian laser beam and the rippled laser beam in collisionless plasma were investigated, and their effects on and the excitation of the electron plasma wave were addressed by considering the ponderomotive and relativistic nonlinearity. Analytical expressions for the growth rate of the laser spike in plasma, the beam width of the rippled laser beam and excited electron plasma wave were obtained using paraxial ray approximation. These second-order differential equations of dimensionless beam width parameter were solved numerically. The results showed that increasing the density of plasma improved the self–focusing of the laser beam, the ripple laser beam and the electron wave plasma. Moreover, increasing the self-focusing of ripple beam laser enhanced the electrostatic potential of the electron plasma wave.

Keywords: ripple laser beam, electron plasma wave, paraxial, self-focus

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