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Self-focusing and de-focusing of intense left and right-hand polarized laser pulse in hot magnetized plasma: laser out-put power and laser spot-size

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Abstract

In this work, self-focusing of an intense circularly polarized laser pulse in hot magnetized plasma using Maxwell's equations and relativistic fluid momentum equation is investigated. An envelope equation governing the spot-size of laser beam for both of left- and right-hand polarizations has been derived and the effects of the plasma temperature and magnetic field on the spatial electron density distribution of hot plasma with respect to variation of normalized laser spot-size has been studied. Numerical results indicate that with increasing the magnetic field strength self-focusing of the right-hand polarization laser pulse increases, while for the left-hand polarization, laser de-focusing enhances. Furthermore, it is found that for right-hand polarization of the incident laser, when the external magnetic field strength enhances the laser spot-size reduces and laser pulse becomes focused. In fact, effect magnetic field on the density profile in right-hand polarization is more prominent. Also it is shown that plasma temperature has a significant role in the, laser spot-size, laser out-put power and the variation of plasma density.

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