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Self Action Effects of Asymmetric q-Gaussian Laser Beams in Collisionless Plasmas

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Theoretical investigation on optical self action effects of intense q-Gaussian laser beams interaction with collisionless plasmas have been investigated in detail. Emphasis is put on investigating the dynamics of beam width and axial phase of the laser beam. Effect of the ellipticity of the cross section of the laser beam also has been incorporated. Using variational theory based on Lagrangian formulation nonlinear partial differential equation (P.D.E) governing the evolution of beam amplitude has been reduced to a set of coupled ordinary differential equations for the beam widths of the laser beam along the transverse directions. The evolution equation for the axial phase of the laser beam has been obtained by the Fourier transform of the amplitude structure of the laser beam from coordinate space to $(k_x; k_y)$ space. The differential equations so obtained have been solved numerically to envision the effect of laser-plasma parameters on the propagation dynamics of the laser beam.

Topics

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