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Consideration of self-focusing of a Gaussian laser pulse with weak relativistic approximation in a plasma

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Abstract

In this study, we considered the self-focusing of a Gaussian laser pulse in an unmagnetized plasma. The equation of plasma density evolution that includes the electrons ponderomotive force is obtained. Then an equation for the width of laser pulse with a relativistic mass correction term is derived. This term is proportional to the electrons temperature. It is shown that in the large width limit we have an oscillatory solution, and for the small width limit this correction always helps the self-focusing of the laser pulse

Keywords: Gaussian laser pulse, relativistic plasma, self-focusing, width of laser pulse, plasma density, ponderomotive force

For full article, refer to the Persian section