Modulational instability of nonlinear electromagnetic waves in plasma Bragg grating

Jafar Borhanian*

Department of Physics, Faculty of Science, Univerity of Mohaghegh Ardabili, P.O.Box 179, Ardabil, Iran

Abstract

In this study, the nonlinear propagation of electromagnetic waves in a plasma Bragg grating is considered. In a weakly relativistic regime, two coupled equations are found that govern the evolution of the envelopes of forward and backward propagating waves in a cold unmagnetized plasma undergoing an ambient density modulation in the form of gratings using Maxwell's equations along with a plasma fluid model. Then, the nonlinear plane wave solutions with constant amplitude are obtained and the stability of them against a small perturbation is investigated. The dependence of the growth rate and instability window on relevant parameters of the system is addressed.

* Corresponding Author: Borhanian@uma.ac.ir