



Iranian Journal of Physics Research, Vol. 18, No. 2, 2018

The influence of self-electric and self-magnetic fields on the coupling of waves in a free electron laser with background plasma

M Akbari Alashti and T Mohsenpour

Department of Physics, Faculty of Basic Sciences, University of Mazandaran, Babolsar, Iran

E-mail: mohsenpour@umz.ac.ir

(Received 27 February 2017 ; in final form 31 December 2017)

Abstract

In this study, instability of waves in a free electron laser with background plasma, under the influence of self-electric and self-magnetic fields, is analyzed. A dispersion relation in the Raman regime for the free electron laser with a helical wiggler magnetic field and an axial magnetic field is derived, such that all possible wave modes can have unstable couplings with each other. This dispersion relation is solved numerically to investigate the influence of self-fields on the unstable couplings. It is found that self-fields reduce the growth rate of the group I orbits and increase it in the group II orbits.

Keywords: free electron laser, background plasma, helical wiggler, instability, coupling

For full article, refer to the Persian section