

395.

Accession number:13013102

Title:Excitation of terahertz radiation by an electron beam in a dielectric lined waveguide with rippled dielectric surface

Authors:Tripathi, D. (1); Uma, R. (1); Tripathi, V.K. (2)

Author affiliation:(1) Center for Energy Studies, Indian Inst. of Technol. Delhi, New Delhi, India; (2) Dept. of Phys., Indian Inst. of Technol. Delhi, New Delhi, India

Source title:Physics of Plasmas

Abbreviated source title:Phys. Plasmas (USA)

Volume:19

Issue:9

Publication date:Sept. 2012

Pages:093105 (6 pp.)

Language:English

ISSN:1070-664X

CODEN:PHPAEN

Document type:Journal article (JA)

Publisher:American Institute of Physics

Country of publication:USA

Material Identity Number:AV41-2012-011

Abstract:A relativistic electron beam propagating through a dielectric lined waveguide, with ripple on the dielectric surface, excites a free electron laser type instability where ripple acts as a wiggler. The spatial modulation of permittivity in the ripple region couples a terahertz radiation mode to a driven mode of lower phase velocity, where the beam is in Cerenkov resonance with the slow mode. Both the modes grow at the expense of beam energy. The terahertz frequency increases as the beam velocity increases. The growth rate of the instability goes as one third power of beam density.

Number of references:18

Inspec controlled terms:free electron lasers - permittivity - plasma density - plasma dielectric properties - plasma electromagnetic wave propagation - plasma filled waveguides - plasma instability - plasma transport processes - relativistic plasmas - terahertz waves - wigglers

Uncontrolled terms:terahertz radiation excitation - dielectric lined waveguide - rippled dielectric surface - relativistic electron beam propagation - free electron laser type instability - spatial modulation - permittivity - phase velocity - Cerenkov resonance - terahertz frequency - growth rate - beam density

Inspec classification codes:A5240F Antennas in plasma; plasma-filled wave guides - A5260 Relativistic plasma - A5235P Plasma instabilities - A5225M Plasma dielectric properties - A5225F Plasma transport properties - A5225L Plasma temperature and density - A5240D Electromagnetic wave propagation in plasma

Treatment:Theoretical or Mathematical (THR)

Discipline:Physics (A)

DOI:10.1063/1.4751457

Database:Inspec

Copyright 2012, The Institution of Engineering and Technology