210
Accession number:20123915469908
Title:Generation of powerful terahertz emission in a beam-driven strong plasma turbulence
Authors:Arzhannikov, A.V. (1); Timofeev, I.V. (1)
Author affiliation:(1) Budker Institute of Nuclear Physics SB RAS, 630090, Novosibirsk, Russia; (2) Department of Physics, Novosibirsk State University, 630090, Novosibirsk, Russia
Corresponding author:Arzhannikov, A.V.
Source title:Plasma Physics and Controlled Fusion
Abbreviated source title:Plasma Phys Controlled Fusion
Volume:54
Issue:10
Issue date:October 2012
Publication year:2012
Article number:105004
Language:English
ISSN:07413335
E-ISSN:13616587
CODEN:PLPHBZ
Document type:Journal article (JA)
Publisher:Institute of Physics Publishing, Temple Circus, Temple Way, Bristol, BS1 6BE, United Kingdom
Abstract:The generation of terahertz electromagnetic radiation due to the coalescence of upper-hybrid waves in the long-wavelength region of strong plasma turbulence driven by a high-current relativistic electron beam in a magnetized plasma is investigated. The width of the frequency spectrum and the angular characteristics of this radiation for various values of plasma density and turbulence energy are calculated using the simple theoretical model adequately describing beam-plasma experiments at mirror traps. It is shown that the power density of electromagnetic emission at the second harmonic of plasma frequency in the terahertz range for these laboratory experiments can reach the level of 1MWcmsup3/sup with 1% conversion efficiency of beam energy losses to electromagnetic emission. © 2012 IOP Publishing Ltd.
Number of references:19
Main heading:Electromagnetic wave emission
Controlled terms:Coalescence - Conversion efficiency - Electromagnetic dispersion - Electron beams - Energy dissipation - Magnetohydrodynamics - Plasma density - Plasma turbulence - Plasma waves
Uncontrolled terms:Angular characteristics - Electromagnetic emissions - Frequency spectra - High-current - Laboratory experiments - Long wavelength - Magnetized plasmas - Mirror trap - Plasma frequencies - Power densities - Relativistic electron beam - Second harmonics - Tera Hertz - Terahertz emissions - Terahertz range - Theoretical models - Turbulence energy - Upper-hybrid waves
Classification code:932 High Energy Physics; Nuclear Physics; Plasma Physics - 801.3 Colloid Chemistry - 711.1 Electromagnetic Waves in Different Media - 932.3 Plasma Physics - 711 Electromagnetic Waves - 525.5 Energy Conversion Issues - 525.4 Energy Losses (industrial and residential) - 615.3 Magnetohydrodynamics (MHD) Power Generation

DOI:10.1088/0741-3335/54/10/105004
Database:Compendex