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Accession number:20120814786150

Title:Numerical simulations of THz emission from the laser wakefields through linear mode conversion

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Source title:Optics and Laser Technology

Abbreviated source title:Opt Laser Technol

Volume:44

Issue:5

Issue date:July 2012

Publication year:2012

Pages:1598-1602

Language:English

ISSN:00303992

CODEN:OLTCAS

Document type:Journal article (JA)

Publisher: Elsevier Ltd, Langford Lane, Kidlington, Oxford, OX5 1GB, United Kingdom

Abstract:A nonlinear one-dimensional particle-in-cell (PIC) program is used to simulate the generation of high power terahertz (THz) emission from the interaction of an ultrashort intense laser pulse with underdense plasma under magnetized and unmagnetized cases. The magnetic field in laser-irradiated plasma has an important effect on the resonant absorption, and makes the results different. The spectra of THz radiation are compared under different cases (with or without external magnetic field), and the optimized parameters including plasma density scale length, incident angle and external magnetic field are calculated. High-amplitude electron plasma wave driven by a laser wakefield can produce powerful THz emission through linear mode conversion under certain conditions. With incident laser intensity of 10<sup>18</sup>W/<sup>cm2</sup>, the generated emission is computed to be of the order of several MV/cm field and tens of MW level power. It is suitable for the studies of high-field and nonlinear physics in the THz regime. &copy; 2011 Elsevier Ltd. All rights reserved.

Number of references:9

Main heading: Magnetic fields

Controlled terms:Plasma density - Plasma waves

Uncontrolled terms:Electron plasma waves - External magnetic field - High-field - High-power -Incident angles - Incident laser - Laser wake field - Linear mode conversion - Nonlinear physics -Optimized parameter - Particle-in-cell - Particle-in-cell simulations - Resonant absorption -Scale length - Terahertz emissions - THz emission - THz radiation - Ultra-short intense laser pulse - Underdense plasmas

Classification code:701.2 Magnetism: Basic Concepts and Phenomena - 932.3 Plasma Physics DOI:10.1016/j.optlastec.2011.11.042

Database:Compendex

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