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Title:Numerical simulations of THz emission from the laser wakefields through linear mode conversion
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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 $10^{18}W/cm^2$, 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.
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Inspec controlled terms:plasma density - plasma light propagation - plasma simulation - terahertz wave generation
Uncontrolled terms:numerical simulations - laser wakefields - linear mode conversion - nonlinear 1D particle-in-cell program - terahertz emission generation - ultrashort intense laser pulse - underdense plasma - laser irradiated plasma - resonant absorption - plasma density scale length - incident angle - external magnetic field are calculated - high amplitude electron plasma wave - incident laser intensity - nonlinear physics
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