287
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Title:Design and simulation of 0.4 THz gyro-traveling wave tube
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Abstract:With the help of 3D PIC software, the beam-wave interaction for a 0.4 THz confocal gyro-traveling-wave tube was simulated. With the consideration of cold dispersion characteristics and diffraction loss of the confocal waveguide, HE<inf>06</inf> mode is chosen as the interaction working mode. For the purpose of suppressing competing mode, a sever structure is used. In the simulation process, with the adjusting of beam voltage, beam current, working magnetic field, and velocity ratio, the optimized working parameters are found. At last, the operating parameters are chosen as 34 kV beam voltage, 14.25 T magnetic field, 2 A beam current, 0.75 velocity ratio, and with the input power of 1 W, 2.76 kW output power is achieved. The gain exceeds 34 dB, the 3 dB bandwidth achieves 8 GHz, and the efficiency achieved 4%.
Number of references:11
Main heading:Cold working
Controlled terms:Dispersion (waves) - Gyroscopes - Magnetic fields - Traveling wave tubes - Waveguides
Uncontrolled terms:3 dB bandwidth - Beam currents - Beam voltage - Beam-wave interactions - Confocal waveguides - Design and simulation - Diffraction loss - Dispersion characteristics - Gyro-traveling wave tube - Input power - Operating parameters - Output power - Simulation process - Tera Hertz - Velocity ratio - Working mode - Working parameters
Classification code:545.3 Steel - 701.2 Magnetism: Basic Concepts and Phenomena - 711.1 Electromagnetic Waves in Different Media - 714.1 Electron Tubes - 714.3 Waveguides - 943.1 Mechanical Instruments
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