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Simulation of the O-X-B conversion process in dense magnetized plasmas MOHAMMAD ALI ASGARIAN, JOHN VERBONCOEUR, Department of Electrical and Computer Engineering, Michigan State University, USA, AKBAR PARVAZIAN, Department of Physics, Isfahan University of Technology, Isfahan, 84156-83111, Iran — Electron Bernstein waves (EBWs) are special electrostatic cyclotron waves which propagate with a short wavelength in hot plasma. EBWs are useful for core plasma heating, current drive and temperature diagnostics in high density plasma devices like stellarators and tokamaks. The resonance of EBWs is close to the cyclotron harmonics, and they do not have a density cut-off. The ordinary-extraordinary-Bernstein(O-X-B) conversion is one of the processes for generating EBWs. The generated EBW propagates in the region with density higher than ordinary wave cut-off and is strongly absorbed at the electron cyclotron harmonics. As such, EBWs may provide local electron heating and current drive. This double conversion process has been simulated using the XOOPIC code. XOOPIC is a 2D PIC code with 3D electrostatic and electromagnetic field solvers for slab and cylindrical geometries. The O-X-B simulation has been done in a slab plasma, using the electromagnetic field solver and a surface impedance wave source to generate the O-wave. The maximum energy transformation in O-X conversion will be ensured with the optimized refractive index, parallel to toroidal magnetic field. Moreover, the dependence of the conversion efficiency on the density gradient scale length will be considered.

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