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Kinetic simulations of X-B and O-X-B mode conversion A. AREFIEV, Institute for Fusion Studies, Univ. of Texas at Austin, USA, E.J. DU TOIT, York Plasma Institute, Department of Physics, University of York, UK, A. KOHN, Max Planck Institute for Plasma Physics, Garching, Germany, E. HOLZHAUER, IGVP, University of Stuttgart, Germany, V.F. SHEVCHENKO, EURATOM/CCFE Fusion Association, Culham Science Centre, UK, R.G.L. VANN, York Plasma Institute, Department of Physics, University of York, UK — High-performance spherical tokamaks are usually overdense (typically ω_{pe}/ω_{ce} 4 in the core) and so regular electron cyclotron emission is blocked. However, electron Bernstein waves, generated at the local cyclotron frequency (and its harmonics) in the core may be observed outside the plasma via a mode conversion process that takes place typically in the plasma edge between an electromagnetic mode and the (electrostatic) electron Bernstein wave. Understanding the details of this mode conversion process is important in tokamaks with over-dense plasmas both for the interpretation of microwave diagnostic data and to assess the feasibility of EBW heating and/or current drive. To this end, we have performed the first ever 2-D fully-kinetic simulations of O-X-B mode conversion using the particle-in-cell code EPOCH. In addition to benchmarking these numerical results against the linear dispersion relation, we have also investigated nonlinearities associated with a larger incident intensity and the effect of a steeper (and more realistic) density gradient at the mode conversion layer. Simulations were performed on the HELIOS supercomputer at the IFERC-CSC, Rokkasho, Japan and on TACC supercomputers at the University of Texas at Austin.

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