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MODELING THE ELECTROMAGNETIC FIELD IN ANISOTROPIC INHOMOGENEOUS MAGNETIZED PLASMA OF ECR ION SOURCES

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We present a numerical approach to solve the 3D Maxwell-Lorentz system with the aim of investigating the interaction of the electromagnetic waves with the magnetized non-homogeneous plasma produced inside Electron Cyclotron Resonance Ion Sources. The FEM COMSOL Multiphysics® software was used to compute the electromagnetic field in a cavity filled by the anisotropic-inhomogeneous plasma, described by a full non-uniform dielectric tensor in "cold plasma" approximation. The full-wave solution is then coupled to an "in-Matlab"developed kinetic code based on a PIC –Particle-In-Cell strategy, solving the Newton-Lorentz equation of motion for plasma electrons. Our model explains the experimentally observed frequency sensitivity and gives a relevant contribution to the challenging goal of predicting the electron/ion dynamics in ECR plasmas.

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