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Full-wave Feasibility Study of Magnetic Diagnostic based on O-X Mode Conversion and Oblique Reflectometry Imaging F.A. VOLPE, M. CHOI[1], Y. PATEL, Columbia U., O. MENEGHINI, ORAU — We present initial two-dimensional full-wave modeling of an innovative diagnostic of the magnetic field vector as a function of the minor radius in the pedestal region. An angularly broad millimeter-wave beam of ordinary (O) polarization is obliquely injected in the magnetized plasma; part of it converts in the extraordinary (X) mode at the O-mode cutoff, the rest is reflected. The reflected beam pattern, measured with an array of receivers, contains information on the angular-dependent mode conversion, which contains information on the magnetic pitch angle at the cutoff. Measurements at various frequencies provide radially resolved measurements of pitch angle. The new technique proposed does not require the plasma to be an overdense emitter of Electron Bernstein Waves and is applicable whenever reflectometry is applicable. Simulations performed with the finite-element COMSOL Multiphysics code in "DIII-D-like" plasma slabs confirmed the presence of a minimum in reflectivity of an externally injected O-mode beam. The dependence of such reflectivity "hole" upon magnetic field is under study. Future inclusion of toroidal ripple, density and magnetic fluctuation effects, as well as possible extensions to a fully three-dimensional diagnostic of the magnetic field will be discussed.

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