

Abstract Submitted
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Magnetic and density contributions to Faraday rotation in a synthetic polarimeter¹ SAMUEL PEANA, LINDA SUGIYAMA, WILLIAM BERGERSON, MIT — A synthetic diagnostic has been developed for the far-infrared polarimeter [1] used in the Alcator C-Mod experiment, based on the the VisIt visualization program. Line integrals of the electron density and magnetic field component in the direction of the viewing chord measure the Faraday rotation of the magnetic field, $\delta\psi_F \simeq c_f(\int \delta n_e \mathbf{B} \cdot d\mathbf{l} + \int \mathbf{n}_e \delta\mathbf{B} \cdot d\mathbf{l})$. Experimentally \mathbf{B} can only be measured at the edge of the plasma, so its contribution to the rotation, relative to δn_e , is indeterminate. MHD simulation of a C-Mod ohmic impurity snake [2] using M3D shows a 1/1 internal kink-type magnetic perturbation, with $m = 1, 2, 3$ components extending to the plasma edge. The synthetic diagnostic sees an overall $n = 1$ toroidal oscillation on all three chords, consistent with experiment. The δn_e contribution is comparable to $\delta\mathbf{B}$ near the plasma edge (vertical $r = 23$ cm), but increases to 20x larger at $r = 10$, just outside the snake, while $\delta\mathbf{B}$ remains relative constant. Further comparisons will be presented.

[1] W. Bergerson, et al., Rev. Sci. Instr. **83** 10E316 (2012).

[2] L. Sugiyama, Phys. Plasmas **20** 032504 (2013).

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