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Modeling and laboratory test of a prototype polarimeter for magnetic fluctuation measurements on NSTX[1] JIE ZHANG, NEAL CROCKER, TROY CARTER, SHIGEYUKI KUBOTA, TONY PEEBLES, UCLA — Polarimetry is a powerful technique capable of probing magnetic field fluctuations in fusion plasmas. [W. X. Ding et al. Phys. Rev. Lett. **90**, 035002 (2003).] A 288 GHz polarimeter operating along a major radial chord in a retroreflection geometry is being developed for NSTX to determine magnetic fluctuations in the frequency range from 1∼100 kHz. Modeling is used to investigate the sensitivity of this planned system to magnetic fluctuations resulting from tearing modes, Alfvén eigenmodes, etc. Preliminary analysis suggests that measurement of relative magnetic fluctuation levels $\geq 0.1\%$ is feasible. Previous calculations based on NSTX plasma equilibria have revealed an interaction between Faraday rotation and Cotton-Mouton effects, which can complicate interpretation. [J. Zhang et al. RSI (Oct, 2010).] A prototype system is under laboratory test to determine measurement sensitivity and establish the optimum detector configuration for measurement of the full polarization state.

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Jie Zhang
UCLA

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