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Initial tests of NSTX millimeter-wave polarimeter on DIII-D[1]
J. ZHANG, W.A. PEEBLES, T.A. CARTER, N.A. CROCKER, E.J. DOYLE, S. KUBOTA, T.L. RHODES, G. WANG, L. ZENG, UCLA — Polarimetry is a powerful diagnostic technique to probe plasma equilibria and magnetic fluctuations in fusion plasmas. In high beta plasma devices such as NSTX, these measurements are important for understanding the stability, structure and anomalous transport induced by electromagnetic turbulent fluctuations. A 288 GHz polarimeter operating along the major radius has been developed and is being tested on DIII-D prior to deployment on NSTX-U. The system launches a rotating linearly polarized beam and detects phase shifts related to polarization changes due to the plasma. To improve phase resolution, quasi-optical isolation is used to minimize multi-path feedback effects. Preliminary data indicates that equilibrium results are consistent with synthetic diagnostic calculations. Typically, phase resolution of <1 degree is observed over a frequency range from 5 to 300 kHz, opening the possibility for the measurement of magnetic fluctuations. Measured spectra indicate the presence of various coherent modes, e.g. Neoclassical Tearing Modes, Toroidal Alfvén Eigenmodes. Analysis is underway to establish whether these spectral components are primarily caused by magnetic fluctuations.

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Jie Zhang
UCLA

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