

Abstract Submitted  
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**Measurement of the Amplitude and Phase of External Kink Modes Using a Hall Probe Sensor Array on the HBT-EP Tokamak\***

Y. LIU, G.A. NAVRATIL, D.A. MAURER, M.E. MAUEL, T.S. PEDERSEN, A. KLEIN, N. STILLITS, Columbia University — In HBT-EP a one-dimensional high-spatial resolution 20 element Hall sensor array has been developed to directly measure the edge plasma perpendicular magnetic field and its fluctuations as a function of radius with 4 mm resolution. The array employs new small-area, high-sensitivity Indium Antimonide (InSb) Hall probes in combination with a high-density seven layer printed circuit board to provide for connections to supply Hall current, record the measured Hall voltage output signals, and mitigate inductive pickup. The array provides accurate knowledge of edge current profile and safety factor parameters, which are essential in the determination of tokamak equilibrium and stability. Using both the new internal Hall magnetic field measurements and external pick-up coil measurements allows accurate equilibrium reconstruction for stability analysis of HBT-EP plasmas. Plasma stability and equilibrium parameters are then used in the Fitzpatrick-Aydemir equations [1] to derive the RWM and plasma mode eigenvectors describing the external fluxes. In discharges with RWM activity, the measured mode structure in the vacuum region given by the model is consistent with Hall sensor array measurements. \*Supported by U.S. DOE Grant DE-FG02-86ER53222. [1] R. Fitzpatrick and A. Y. Aydemir, Nuc. Fusion, **36**, 11, (1996).

Yuhong Liu

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