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Theory Experiment

MSE Analysis Techniques for Determining Local Current Profile Features, New Calibration Tools, and an Update on the New DIII-D Counter-Beam MSE,* C.T. Holcomb, M.A. Makowski, R.J. Jayakumar, *LLNL*, and C.C. Petty, *GA* – We critique analysis techniques that seek to reconstruct the maximum spatial detail regarding the current density profile from the magnetic field pitch angles measured by motional Stark effect (MSE) polarimetry. Local features of interest include the missing bootstrap current in neoclassical tearing modes (NTMs), current drive from electron cyclotron waves, current holes, and neoclassical current in the H-mode pedestal. These techniques rely on either more detailed spline fitting in a reconstruction or direct evaluation of Ampere's Law using discrete MSE measurements of B_z^l . The level of detail and resulting uncertainty in j depend on the type of curve fit (or interpolation) to the B_z^l . For example, placing a current density extremum at a MSE channel location is tantamount to taking spatial derivatives of the B_z^l measurements using spline interpolation. We also discuss a new technique to improve channel-to-channel calibration in the edge MSE array and report the status of the new counter-beam MSE on DIII-D.

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