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Magnetic field amplitude and pitch angle measurements using Spectral MSE on EAST and Alcator C-Mod[1] KEN LIAO, WILLIAM ROWAN, Institute for Fusion Studies, University of Texas at Austin, JIA FU, BO LYU, YING-YING LI, Institute of Plasma Physics Chinese Academy of Science, OLEKSANDR MARCHUK, Forschungszentrum Jlich GmbH, YURI RALCHENKO, NIST — Magnetic field amplitude and pitch angle measurements follow from the analysis of the Motional Stark Effect spectrum emitted by high energy neutral beam emission in tokamaks. Here we focus on deriving these quantities on EAST and Alcator C-Mod. These measurements provide a cross check for the polarimetry MSE diagnostics, and also act as a proof of principle for a spectral MSE diagnostic, which could potentially provide real-time measurements of the magnetic field and be used to increase the accuracy of equilibrium reconstruction. Measurement uncertainty is evaluated using the NBASS synthetic diagnostic. The same code allows design of measurements with improved accuracy such as spectral measurements techniques which take advantage of polarization. Accurate fitting of the MSE spectrum requires taking into account non-statistical beam excited state populations. The spectral MSE analysis techniques have applications to measurement of the beam density, which allows for improved analysis of the charge exchange recombination spectroscopy diagnostic. Resolution of beam components improves with increased beam energy and magnetic field, so these techniques have high applicability to future fusion devices.

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