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Performance Assessment of the C-Mod Multi-Spectral Line Polarization MSE (MSE-MSLP) Diagnostic[1] STEVEN SCOTT, PPPL, ROBERT MUMGAARD, MATTHEW KHOURY, MIT/PSFC — The accuracy of the Alcator C-Mod Motional Stark Effect (MSE) diagnostic is limited primarily by partially polarized background light that varies rapidly both in time (1 ms) and space – factor 10 variations are observed between adjacent spatial channels. ITER is likely to operate in a similar regime. Visible Bremsstrahlung, divertor molecular D2 emission, and glowing invessel structures generate unpolarized light that becomes partially polarized upon reflection. Because all three sources are broadband, the background light can be measured in real-time at wavelengths close to the MSE spectrum, thereby allowing the background to be interpolated in wavelength rather than in time. A 10-spatial-channel, 4-wavelength MSE-MSLP system has been developed using polarization polychromators that measure simultaneously the MSE pi- and sigma- lines as well as two nearby wavelengths that were chosen to avoid both the MSE spectrum and all known impurity lines on each sightline. Initial performance evaluation indicates that the background channel measurements faithfully track the background light in the pi- and sigma- lines. The improvement in accuracy of pitch-angle measurements and increased diagnostic flexibility over a wide range of plasma conditions will be reported.

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