

Analysis of current drive using MSE polarimetry without equilibrium reconstruction

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Abstract

A quick yet robust analysis technique has been developed to interpret measurements from the motional Stark effect (MSE) polarimetry diagnostic. The MSE diagnostic measures the vertical component of the magnetic field (B_z) as a function of the plasma major radius. Typically these measurements have been used as a constraint on a numerical calculation of the plasma equilibrium. The analysis technique presented here, which converts the MSE measurements of B_z to quantities of interest using Maxwell's equations and geometric constraints, has some advantages over equilibrium reconstruction analysis because it does not introduce assumptions about the shape of the current profile into the analysis. Further, the results are available immediately after the MSE data are collected. Examples are given of this MSE analysis technique using recent electron cyclotron current drive (ECCD) experiments on the DIII-D tokamak.

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