MEASURED MHD EQUILIBRIUM ON ALCATOR C

by

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ABSTRACT

A method of processing data from a set of partial Rogowski loops is developed to study the MHD equilibrium in Alcator C. Time dependent poloidal fields in the vicinity of the plasma are calculated from measured currents, with field penetration effects being accounted for. Fields from eddy currents induced by the plasma in the tokamak structure are estimated as well. Each of the set of twelve $B_\theta$ measurements can then be separated into a component from the plasma current and a component from currents external to the pickup loops. Harmonic solutions to Maxwell's equations in toroidal coordinates are fit to these measurements in order to infer the fields everywhere in the vacuum region surrounding the plasma. Using this diagnostic, plasma current, position, shape, and the Shafranov term $\Lambda = \beta_p + \zeta_i/2 - 1$ may be computed, and systematic studies of these plasma parameters are undertaken for Alcator C plasmas.