MHD equilibrium reconstruction in the DIII-D tokamak

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Abstract. Physics elements and advances crucial for the development of axisymmetric magnetohydrodynamic (MHD) equilibrium reconstruction to support plasma operation and data analysis in the DIII-D tokamak are reviewed. A response function formalism and a Picard linearization scheme are used to efficiently combine the equilibrium and the fitting iterations and search for the optimum solution vector. Algorithms to incorporate internal current and pressure profile measurements, topological constraints, and toroidal plasma rotation into the equilibrium

reconstruction are described. Choice of basis functions and boundary conditions essential for accurate reconstruction of L- and H-mode equilibrium plasma boundary and current and pressure profiles are discussed. The computational structure used to efficiently integrated these elements into the equilibrium reconstruction code EFIT is summarized.

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