Calculation of Edge Toroidal Current Density Distributions From DIII-D LIBEAM Measurements Using Ampère's Law*

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The local edge current density j(r) is a parameter of basic importance in understanding the stability of high performance tokamaks as well as the dynamics of ELM behavior. On DIII-D the LIBEAM diagnostic provides precise measurements of the local magnetic field projection along the field of view at 32 radial locations in the plasma edge. Using these measurements, the known spatial calibration and a minimal amount of information about the magnetic field shape from equilibrium reconstructions, Ampères law may be used to provide a straightforward parameterization for the edge toroidal current density in terms of the measured B_{VIEW} and its radial derivative. This approach is relatively insensitive to errors in the reconstruction and is simple to apply.

*Work supported by the U.S. Department of Energy under Contract No. DE-AC03-99ER54463.