Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Decomposition of Magnetic Field Boundary Conditions into Parts Produced by Internal and External Sources[1] DAVID LAZANJA, ALLEN BOOZER, Columbia University — Given the total magnetic field on a toroidal plasma surface, a method for decomposing the field into a part due to internal currents (often the plasma) and a part due to external currents is presented. The method exploits Laplace theory which is valid in the vacuum region between the plasma surface and the chamber walls. The method is developed for the full three dimensional case which is necessary for studying stellarator plasma configurations. A change in the plasma shape is produced by the total normal field perturbation on the plasma surface. This method allows a separation of the total normal field perturbation into a part produced by external currents and a part produced by the plasma response. There are immediate applications to coil design. The computational procedure is based on Merkel's 1986 work on vacuum field computations. Several test cases are presented for toroidal surfaces which verify the method and computational robustness of the code.

[1]Supported by DoE grant DE-FG02-95ER54333.

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Date submitted: 25 Jul 2006 Electronic form version 1.4