

Abstract Submitted  
for the APR09 Meeting of  
The American Physical Society

**Interfacing vacuum to m3d-c1 and other nonlinear codes**<sup>1</sup> MORRELL CHANCE, STEPHEN JARDIN, JOSHUA BRESLAU, Princeton Plasma Physics Laboratory — In order to interface the linear 2-D (in equilibrium) VACUUM code to nonlinear 3-D codes a buffer zone is assumed which separates the fully nonlinear region from the intrinsically linear vacuum region. Within the buffer zone the plasma can: 1) gradually transition radially to a vacuum-like (e.g., high resistive) virtual layer where it matches directly to the outer fields calculated by the VACUUM code, or 2) abruptly transition through a thin resistive layer beyond which the fields are again calculated by the VACUUM code. The latter solves for the magnetic scalar potential response to the normal field at the layer, which in both cases is assumed continuous. In case 1) the tangential fields are also continuous, but in case 2) the appropriate discontinuities of the tangential fields across the resistive shell are accounted for. In the outer vacuum region the fields satisfy the outer boundary conditions and is Fourier analyzed in the toroidal angle  $\phi$ . Although the method is not restricted to this, an example is presented where the scalar potential of the VACUUM code matches on to the magnetic field decomposition used in the nonlinear M3D-C1 code currently under development.

<sup>1</sup>This work is supported by U.S. Department of Energy Contract No. DE-AC02-76-CHO-3073

Morrell Chance  
Princeton Plasma Physics Laboratory

Date submitted: 07 Jan 2009

Electronic form version 1.4