1067-35-1931 **U Pablo Suarez*** (psuarez@desu.edu), Department of Mathematical Sciences, Delaware State University, 1200 N. DuPont Highway, Dover, DE 19901. *Galerkin boundary integral analysis of the Grad-Shafranov equation.*

The Magneto Hydrodynamic equilibrium in an axisymmetric plasma is described in terms of the magnetic flux by the Grad-Shafranov Equation. This equation is commonly solved via domain-based discretization approaches such as finite difference and finite element methods. However for plasma equilibrium analysis on actual fusion devices (e.g., Tokamaks) a boundary-only discretization techniques can be very attractive. In a boundary integral equation framework, only the surface of the plasma is discretized and geometric modifications and updates of the plasma surface are inexpensive.

In what follows we solve the Grad-Shafranov Equation using the Galerkin Boundary Element Method. We solve this non-linear partial differential equation combining the Dual Reciprocity Method with an iterative scheme. An expansion of the nonlinearity is given in terms of particular solutions of the Grad-Shafranov equation. Then an iteration procedure is applied to solve the PDE with the source expanded in terms of particular solutions. We can simplify the PDE to a homogenous one. When we apply the iteration procedure we update the boundary conditions only. In this fashion the problem is solved by using Galerkin boundary integral analysis. (Received September 22, 2010)