**The DIII-D Map – An Area-Preserving Map for Trajectories of Magnetic Field Lines in the DIII-D Tokamak** ALKESH PUNJABI, HALIMA ALI, Center for Fusion Research and Training, Hampton University, Hampton, VA 23668, ALLEN BOOZER, Columbia University, New York, NY 10027, TODD EVANS, General Atomics, San Diego, CA 92186 — The EFIT data for the DIII-D shot 115467 3000 ms is used to calculate the generating function for an area-preserving map for trajectories of magnetic field lines in the DIII-D. We call this map the DIII-D map. The generating function is a bivariate polynomial in base vectors $\psi^{1/2}\cos(\theta)$ and $\psi^{1/2}\sin(\theta)$. $\psi$ is toroidal flux and $\theta$ is poloidal angle. The generating function is calculated using a canonical transformation from $(\psi,\theta)$ to physical coordinates (R,Z) in the DIII-D [1] and nonlinear regression. The equilibrium generating function gives an excellent representation of the equilibrium flux surfaces in the DIII-D. The DIII-D map is then used to calculate effects of the magnetic perturbations in the DIII-D. Preliminary results of the DIII-D map will be presented. This work is supported by US DOE OFES DE-FG02-01ER54624 and DE-FG02-04ER54793.
[1] A. Punjabi, H. Ali, T. Evans, and A. Boozer, *Phys Lett A* **364** 140–145 (2007).

Halima Ali
Center for Fusion Research and Training,
Hampton University, Hampton, VA 23668

Date submitted: 17 Jul 2007                    Electronic form version 1.4