Simple Map in Action-Angle Coordinates. OLIVIA KERWIN, ALKESH PUNJABI, HALIMA ALI, Hampton University — The simple map is the simplest map that has the topology of a divertor tokamak. The simple map has three canonical representations: (i) the natural coordinates - toroidal magnetic flux and poloidal angle (ψ, θ), (ii) the physical coordinates - the physical variables (R, Z) or (X, Y), and (iii) the action-angle coordinates - (J, Θ) or magnetic coordinates (Ψ, Θ). All three are canonical coordinates for field lines. The simple map in the (X, Y) representation has been studied extensively [1,2]. Here we analytically calculate the action-angle coordinates and safety factor q for the simple map. We construct the equilibrium generating function for the simple map in action-angle coordinates. We derive the simple map in action-angle representation, and calculate the stochastic broadening of the ideal separatrix due to topological noise in action-angle representation. We also show how the geometric effects such as elongation, the height, and width of the ideal separatrix surface can be investigated using a slight modification of the simple map in action-angle representation. This work is supported by the following grants US Department of Energy - OFES DE-FG02-01ER54624 and DE-FG02-04ER54793 and National Science Foundation - HRD-0630372 and 0411394.
[1] A. Punjabi, H. Ali, T. Evans, and A. Boozer, *Phys Lett A,* **364** 140-145 (2007).
[2] A. Punjabi, A. Verma, and A. Boozer, Phys.Rev. Lett. **69**, 3322 (1992).

Olivia Kerwin
Hampton University

Date submitted: 09 Dec 2007   Electronic form version 1.4