Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

Microwave produced plasma in a Toroidal Device A.K. SINGH, W.F. EDWARDS, E.D. HELD, Physics Department, Utah State University, Logan 84322, UT — A currentless toroidal plasma device exhibits a large range of interesting basic plasma physics phenomena. Such a device is not in equilibrium in a strict magneto hydrodynamic sense. There are many sources of free energy in the form of gradients in plasma density, temperature, the background magnetic field and the curvature of the magnetic field. These free energy sources excite waves and instabilities which have been the focus of studies in several devices in last two decades. A full understanding of these simple plasmas is far from complete. At Utah State University we have recently designed and installed a microwave plasma generation system on a small tokamak borrowed from the University of Saskatchewan, Saskatoon, Canada. Microwaves are generated at 2.45 GHz in a pulsed dc mode using a magnetron from a commercial kitchen microwave oven. The device is equipped with horizontal and vertical magnetic fields and a transformer to impose a toroidal electric field for current drive. Plasmas can be obtained over a wide range of pressure with and without magnetic fields. We present some preliminary measurements of plasma density and potential profiles. Measurements of plasma temperature at different operating conditions are also presented.

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Date submitted: 15 Jul 2010 Electronic form version 1.4