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Development and Characterization of Inverted Helicon Plasma Sources BENJAMIN MASTERS, DAVID RUZIC, University of Illinois at Urbana-Champaign, UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN TEAM — Helicon plasmas are useful as hot, dense sources requiring low magnetic fields. Since Boswell's[1] use of helicon waves in low pressure gas, research has strived to determine the wave-plasma coupling mechanism. Trivelpiece-Gould (TG) modes[2] remain a strong candidate. An inverted helicon plasma source uses a Nagoya Type III dielectric-covered helicon antenna, placed within a vacuum chamber. The antenna is 8.2 cm long, 2.2 cm in radius, using an frequency of 13.56 MHz. Basic dispersion relation theory is developed as an extension of existing helicon theory which includes TG modes and annular helicons[3]. With this arrangement, diagnostic measurements are made inside and outside the antenna volume. To characterize the plasma, an RF-compensated Langmuir probe measures ne and Te, and 3 B-dot probes measure the field shape of the R, Theta and Z components about the antenna region in the R and Z directions. Typical ne and Te in an Ar plasma were found to be $3x10^{18}/m^3$ and 3 eV. The goal of this work is to find another configuration to determine the method of efficient plasma heating. [1] R.W. Boswell, Phys. Lett. 33A, 457 (1970) [2] A.W. Trivelpiece and R.W. Gould, Jour. App. Phys. 30 (11) (1959) [3] M. Yano and M.L.R. Walker, Phys. of Plasmas. 13 (063501) (2006)

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