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Magnetic Field Dependencies in the Mini-RFTF Light Ion Helicon Plasma Source[1] R.H. GOULDING, F.W. BAITY, D.A. RASMUSSEN, D.O. SPARKS, Oak Ridge National Laboratory, M.D. CARTER, Ad Astra Rocket Company, M. YOSHITAKA, Graduate School for Creation of New Photonics Industries — For several years hydrogen plasmas have been produced in the Mini-RFTF Light Ion Helicon device with densities ($\leq 2.5 \times 10^{19} m^{-3}$) comparable to those commonly observed in helicon devices using heavier ion species for comparable input powers (1-5 kW). The use of light ions including hydrogen and helium has allowed the continuous range of regimes $\omega < \omega_{LH}$ to $\omega > \omega_{LH}$, where ω_{LH} is the lower hybrid frequency, to be carefully explored at modest magnetic field strength. A detailed set of electron density and rf $\tilde{B}$ measurements with widely varying —B— at the antenna strongly suggest that in the case of this device, collisional damping of the fast (helicon) wave, with the electric field strength enhanced by the presence of eigenmodes, is responsible for the efficient power coupling to the plasma. The lower hybrid frequency has been shown not to play an important role, at least during equilibrium operation. The extensive evidence in support of these findings will be reviewed

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R.H. Goulding
Oak Ridge National Laboratory

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