Heating of a high density strongly magnetized hydrogen plasma column around the ICR frequency.

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A single loop antenna system is investigated in the ICR frequency range (5-25 MHz) to enable control of the plasma temperature for Magnum-PSI, a large diameter (10 cm) high-flux (10^{24} H+ ions m^{-2} s^{-1}) linear plasma device. The wave propagation is evaluated on basis of the wave damping lengths derived from the dispersion relation. The antenna is numerically analyzed with the TOPCYL[1] code. Simulation results are compared with measured loading resistances and good agreement was found for the vacuum and saltwater column cases. The hydrogen plasma loading resistances determined from network analyzer measurements are typically higher than those predicted from simulation. High RF power operation (1 kW) of the antenna induced an increased power deposition on the plasma dump for specific discharge conditions. In addition, a significant increase of plasma light emission was measured. This points to coupling of RF power to undesired loss mechanisms such as excitation and ionization of background neutrals. An improved antenna that is based on a pair of double half loop antennas, is under development and will be discussed.

[1] S. Guadamuz, this conference