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Experimental Study of a Low Noise Tunable Plasma Antenna Sustained by CW and Pulsed RF Power[1] VLADLEN PODOLSKY, ABBAS SEMNANI, SERGEY MACHERET, Purdue University — Plasma antennas based on electric discharges are attractive because they can withstand high power, and their resonant frequency and bandwidth are tunable by changing the plasma parameters. However, continuous-operation plasma antennas have a very high Johnson-Nyquist thermal noise due to the high electron temperatures, precluding their use as receiving antennas. In this talk, we present results of a tunable antenna consisting of an argon plasma enclosed in a Pyrex tube sustained by a surface wave discharge. We demonstrate the effects of increasing power, changing gas pressure, and varying glass tube diameter on the center resonance frequency and the bandwidth. A comparison of the noise figure for CW antenna to that of a plasma amtenna sustained by RF pulses reveals that on average, the repetitively pulsed plasma has lower levels of thermal noise. Indeed, in the afterglow between the pulses the electron temperature decays much faster than the electron density, substantially reducing the noise. Such characteristics are beneficial to the creation of a plasma antenna that can act as a transmitter of the driving frequency when the pulse is applied and an efficient receiver between the pulses.

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