Abstract Submitted
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Complex Transients in Power Modulated Inductively Coupled Chlorine Plasmas[1] VINCENT M DONNELLY, TYLER LIST, TIANYU MA, PRIYANKA ARORA, University of Houston, STEVEN SHANNON, North Carolina State University — Time-dependent studies of power-modulated chlorine inductively-coupled plasmas will be presented. Power was modulated between high and low states. Time-resolved optical emission, power delivery, and Langmuir probe measurements revealed at least two periodic steady-state conditions upon switching from high to low power: a "normal" mode in which electron temperature (T_e) remains constant, while electron and ion number densities (n_e and n_+) and optical emission spectroscopic (OES) intensities smoothly drop to a level roughly equal to the fractional drop in power, and an "abnormal" mode in which T_e n_e, n_+ and OES intensities plummet before rising to values more commensurate with the drop in power. Whether the plasma operates in the normal or abnormal mode is sensitive to settings on the matching network pressure and pulsing parameters. The ignition delays can be qualitatively understood with the power balance model commonly used to explain instability-induced, self-modulation in highly electronegative plasmas, caused by the slower time response of negative ions compared with electrons.

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