Abstract Submitted
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Evidence of weak plasma series resonance heating in the H-mode of neon and neon/argon inductively coupled plasmas[1] A.E. WENDT, JOHN B. BOFFARD, R.O. JUNG, CHUN C. LIN, L.E. ANESKAVICH, University of Wisconsin - Madison — The shape of the electron energy distribution function (EEDF) in low-temperature plasmas governs the relative rates of electron-impact processes that determine key discharge properties. Comparison of EEDFs measured with probes and optical emission [1] in argon and neon inductively coupled plasmas (ICP) has revealed a surplus of high-energy electrons in neon-containing plasmas. The abundance of these extra high energy electrons is correlated with the sheath thickness near the rf antenna and can be reduced by either adding a Faraday shield or increasing the plasma density. These trends suggest an association of the surplus high-energy electrons with stochastic heating of electrons in capacitively-coupled electric fields in the sheath adjacent to the antenna. Conventional stochastic heating, however, is found to be insufficient to account for the EEDF observations, and a comparison of modeled and experimental values of the 13.56 MHz time modulation of select neon emission lines strongly suggests plasma series resonance (PSR) heating adjacent to the ICP antenna as the source of the extra high-energy electrons.

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