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Study of striations in a spherically symmetric hydrogen discharge
LOWELL MORGAN, Kinema Research & Software, LLC, MONTY CHILDS, MICHAEL CLARAGE, PAUL ANDERSON, Aurtas International, Inc. — We have observed, in experiments similar to those of [1, 2], multiple spherically symmetric striations or double-layers in a hydrogen discharge, sometimes containing a small amount of helium having a total gas pressure in the range 0.7 - 5 Torr. The discharge is a positive corona around a 6mm diameter steel anode driven by a 600V, max 3 Amp DC power supply. Using mass spectrometry we have found that sometimes as much as 10% of the H_2 is dissociated into atomic hydrogen. The dominant positive ion is H_3^+. We have performed UV, visible, and near-IR spectroscopy of the plasma looking at line ratios and Stark broadening in order to obtain an estimate of electron temperature and density. We have also performed Abel transforms on images of the striations in order to find the true relative broad band emissivity from the optically thin plasma as a function of radius out from the anode finding that, typically, it peaks several anode radii out into the plasma striations. Some modeling and simulation of the plasma chemistry and transport will also be presented. Research supported by the International Science Foundation.

[1] Nerushev, *et al.*, Phys. Rev. E **58**, 4897 (1998).
[2] Belikov & Sakhapov, J. Phys D **44**, 045202 (2011).

Lowell Morgan
Kinema Research & Software

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