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Multi-Peaked Distributions of Escaping Electrons in RF-DC Discharge ALEXANDER V. KHRABROV, IGOR D. KAGANOVICH, Princeton Plasma Physics Laboratory, PETER L.G. VENTZEK, LEE CHEN, Tokyo Electron America — Hybrid RF-DC capacitively coupled discharges find important and growing technological applications. In RF-DC systems, secondary electrons emitted from electrodes undergo complicated motion defined by acceleration in, and bouncing between a steady and an oscillating sheath. For the emitted electrons that return to, and impinge upon the RF electrode, the arrival energy is a non-monotonic function of the driving phase at which they were emitted. This basic property leads to a velocity distribution with multiple peaks [1,2]. Such effect may explain the peaks in electron energy distributions measured in RF-DC system at the RF electrode [2,3]. In particular, the distribution of secondary electrons is sensitive to variations in the bouncing time, and may form several peaks if even a small high-frequency ripple is present in the RF sheath voltage [2], as may be the case due to the plasma-sheath resonance (PSR). We have found such features in test-particle simulations of the discharge, and analyzed the observed distributions.

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