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Plasma sheath model in the presence of field-induced electron emission JIBA DAHAL, VENKATTRAMAN AYYASWAMY, University of California - Merced — Microplasmas have become an active area of research during the last two decades with several applications including nanomaterial synthesis, electronics, lighting, biomedicine, and metamaterials for controlling electromagnetic waves. The advances in micro/nanofabrication and the further miniaturization of plasma devices have contributed to the increasing role of new physical mechanisms that were previously neglected. Electric field-induced emission of electrons is one such mechanism that is gaining significance particularly with the discovery of novel electrodes that demonstrate excellent field emission properties. These field emitted electrons and their interaction with microdischarges has shown to affect both pre-breakdown and post-breakdown regimes of operation. The current work focuses on the development of self-consistent sheath model that includes the effects of field-induced electron emission. Sheath models presented earlier accounts for other emission mechanisms such as thermionic and secondary electron emission, the strong influence of electric field on electron emission is shown to lead to unique interplay. The results obtained from the sheath model for various parameters including current-voltage characteristics, and ion/electron number density are validated with PIC-MCC results.

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