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Numerical study of discharge progress and characteristics in Microhollow Cathode Discharge[1] GUANGQING XIA, Dalian University of Technology, GENWANG MAO, MAOLIN CHEN, Northwestern Polytechnical University — The two-dimensional numerical model for Microhollow cathode discharge(MHCD) consists of the continuity equations for electron and ion and Poisson's equation. The model considers the drift-diffusion approximation for the flux of electron and ion and accounts for the mean electron energy dependence of the ionization rate. In the numerical study, two molybdenum foils with 100 μm thickness are stacked on an alumina foil with 250 μm thickness. The ports with the hole diameter 100 μm are drilled. The discharge occurs in argon with the pressure 100 Torr. The computation results show the potential profile, electron density, ion density and electron temperature distribution. The potential contour shows that the axial electric field is dominant at the discharge initialization and then the radial electric field becomes very important as the forming of the cathode sheath. The results indicate the temporal dynamic behavior of MHCD with the electron density of order $10^{19}\mathrm{m}^{-3}$, electron temperature of several to tens of eV. The peak electron/ion density occurs near the region of the cathode and the dielectric as well as near the anode at the discharge initialization, then localizes along the centerline of the hollow near the cathode. Most of the model predictions are in agreement with experimental data for MHCD under the similar conditions.

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