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Micro-Discharges within Voids of Sub-Millimeter Dimensions ALIREZA GANJOVI, Department of Photonics, International Center of Science & High Technology & Environmental Science, Mahan, Kerman, Iran, GHASEM RASTPOOR — A two-dimensional kinetic model to study the evolution of micro-discharges within a void of sub-millimeter dimensions inside polymeric dielectrics has been developed using a Particle-in-Cell (PIC) algorithm. The formation of avalanches in gas-filled channels by ionization and electron attachment is traced. The elastic and inelastic inter-particle collisions are simulated using a stochastic Monte Carlo Collision (MCC) technique. The Poisson's equation is solved using the dynamic alternating direction implicit (DADI), which has good convergence. The discharge within the void is studied in conjunction with the external circuit. Secondary processes including photo-emission and ion-emission from the cathode are considered. The model studies the development of avalanche discharges within channels and the role of the space charge modified field during propagation of micro-discharges. The model is used to successfully simulate the evolution of the discharge and yield useful information about the build-up of space charge within the channel and the consequent modification of the applied electric field. The effect of width of void on the number of micro-discharges and their propagation will be studied.

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