

Abstract Submitted  
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**Simulation of Breakdown in Gas Volumes Inside Dielectrics**

IGOR PASHININ, SERGEY PANCHESHNYI, SEVERINE LE ROY, LEANNE C. PITCHFORD, LAPLACE, CNRS and University of Toulouse, France — The objective of the present work is to develop a self-consistent model of DC and AC discharges in small voids in insulating materials encompassing an improved description of processes linked to the dielectric itself. To this end, a 1D fluid model based on transport equations for charge carriers coupled to Poisson's equation for electric fields was constructed for dielectrics containing air-filled voids of various sizes. Electron emission from the dielectric surface at the dielectric-gas interface is either continuous or discrete and is supposed to depend on the electric field at the surface. For DC voltages we find that current pulses exist for a range of conditions. These are due to the rapid accumulation of positive charges at the interface in partial discharge events and their eventual neutralization by electrons injected from the cathode and moving in the bulk dielectric. In AC, the transport of charges inside the dielectric has little influence on the discharge dynamics in gas, and the emission properties at the interface determine the shape and repetition rate of the current pulses.

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