Abstract Submitted
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Breakdown characteristics of high intensity discharge lamps filled with xenon[1] MARTIN WENDT, SILKE PETERS, MANFRED KETTLITZ, FLORIAN SIGENEGER, INP Greifswald, Felix-Hausdorff-Str. 2, 17489 Greifswald, Germany — A comparison between measured and modelled breakdown voltages of HID lamps filled with xenon at pressures of 0.1–5 bar is presented. Measurements of current and voltage characteristics and high speed photography were done on specially prepared lamps at voltage rise times of 1 MV/s to 2×10^5 MV/s. The model consists of the Poisson equation and continuity equations for electrons and ions using the drift-diffusion approximation for the particle fluxes. Transport parameters for the electrons as functions of E/N have been determined by solving the 0-D Boltzmann equation. Appropriate boundary conditions couple the plasma to the outer circuit. The model is solved on a 1-D, inhomogeneous grid using an adaptive time step. Following the cubic interpolated propagation scheme each time step is divided into advective and non-advective parts. The latter is solved by applying the Crank-Nicholson scheme. The model gives a cathode-directed ionization front which turns into a cathode sheath. The model breakdown voltages increase with filling pressure and voltage rise time and are in good agreement with experiments.

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