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**Modeling of the spatiotemporal behavior of an argon glow discharge at atmospheric pressure** MARKUS M. BECKER, DETLEF LOFFHAGEN, INP Greifswald — The spatiotemporal behavior of gas discharges is described by means of a fluid model which comprises the coupled set of balance equations for the densities of electrons, ions and neutral particles, the electron energy balance equation as well as Poisson's equation for the electric potential. This system of equations is numerically solved using a stabilized finite element method. The discharge voltage required for the solution of Poisson's equation is determined from the solution of the external electric circuit equations taking into account the time-dependent capacity and resistance of the plasma. In the present contribution first results related to an argon plasma at atmospheric pressure in a discharge configuration designed to generate small homogeneous high-pressure glow discharges[1] are presented. Main features of the temporal evolution of the discharge, which can be divided into Townsend, ignition, quasi-steady-state and recombination phase, are discussed. It is found that the cathode-fall thickness and current density in the quasi-steady state are of the order of the values given by the similarity laws for normal glow discharges.

[1]W. Bötticher et al., *Appl. Phys. B* **54** (1992) 295

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