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Analysis of the spatiotemporal behaviour of a He-Xe column plasma by self-consistent modelling DETLEF LOFFHAGEN, FLORIAN SIGENEGER, INP Greifswald, F.-L.-Jahn-Str. 19, 17489 Greifswald, Germany — The positive column plasma of a glow discharge constitutes a typical representative of a non-equilibrium plasma. Large effort has been spent in recent years to get a deeper understanding of its inherent temporal and spatial dynamics. This presentation reports on a new self-consistent method for the analysis of the space- and time-dependent behaviour occurring in a cylindrical, axially homogeneous column plasma of low-pressure glows. The model consists of hydrodynamic equations for all charged and neutral particles in the plasma, Poisson's equation describing the behaviour of the radial space charge field, the balance equation of the discharge current for the determination of the axial electric field and the time-dependent, radially inhomogeneous Boltzmann equation providing transport and rate coefficients of the electrons. First results obtained for the spatiotemporal evolution of a He-Xe mixture plasma containing 2% of xenon in a discharge tube with a radius of 9 mm at a gas pressure of 2.5 Torr and given time-dependence of the discharge current are discussed. Starting from a homogeneous and field-free initial situation the transition to steady state at a discharge current of 60 mA is considered showing large structural changes in space and time for the electric field and the particle and flux densities of the different plasma components.

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