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Hybrid modelling of an ac-driven low-pressure He-Xe lamp discharge DETLEF LOFFHAGEN, FLORIAN SIGENEGER, INP Greifswald, Felix-Hausdorff-Str. 2, 17489 Greifswald, Germany — The spatiotemporal evolution of the column plasma of an ac-driven glow discharge in He-Xe mixtures is analyzed by means of hybrid modelling. The theoretical description of the cylindrical, axially homogeneous discharge plasma is based on the coupled solution of hydrodynamic equations for the charge carriers and neutral species in the plasma, equations of the external electric discharge circuit for the determination of the axial electric field, the Poisson equation describing the behaviour of the radial space charge field and the time-dependent, radially inhomogeneous Boltzmann equation providing the transport and rate coefficients of the electrons. Results of the periodic behaviour of the plasma in a discharge tube with a diameter of 18 mm at a gas pressure of 2.5 Torr using a mixture of 98% helium and 2% xenon are discussed. Pronounced structural changes of the particle and flux densities of the different plasma components, the electric field components and the energy distribution of the electrons are found. In particular, the electron energy flux changes between a purely outward directed flux and a partly inward and outward directed one during the period. The comparison with experimental data of discharge voltage and current as well as excited state densities of xenon shows good agreement between calculated and measured data.

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