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Study of non-local electron kinetics in a low-pressure afterglow argon plasma[1] SERGEY GORCHAKOV, FLORIAN SIGENEGER, DIRK UHRLANDT, INP Greifswald, F.-L.-Jahn-Str. 19, 17489 Greifswald, Germany —
Non-isothermal pulsed plasmas are widely used for technological applications. The specific properties of these plasmas could be adjusted by appropriate choice of operation conditions. In particular, the switch-off period of a discharge has a strong influence on the time-averaged plasma properties. In this contribution results of theoretical investigations of the early afterglow, i.e. the range of few microseconds after switching off the power input, in an argon plasma of an inductively coupled discharge at pressures of few Pa are presented. Under these conditions the kinetic behaviour of the electron component dominates the plasma properties. The plasma is studied by means of a self-consistent model which includes the non-local electron kinetic approach taking, in particular, the impact of electron-electron collisions and of electron cooling due to ambipolar losses to the walls (diffusive cooling) into account. The results for temporal evolutions of the velocity distribution function, density and mean energy of electrons and the space-charge potential are discussed in comparison with recent experimental data. Good agreement has been found. The analysis confirms the significant influence of the diffusive cooling on the plasma properties and shows a marked impact of electron-electron collisions on the afterglow behaviour.

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