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Phase-resolved modelling of a filamentary argon plasma in an RF plasma jet F. SIGENEGER, M. M. BECKER, J. SCHÄFER, R. FOEST, D. LOFFHAGEN, Leibniz Institute for Plasma Science and Technology, Felix-Hausdorff-Str. 2, 17489 Greifswald, Germany — A time-dependent, spatially two-dimensional fluid model, combined with a model of the gas flow and heating, is used to describe the RF plasma in a miniaturized non-thermal plasma jet. The jet is configured as a capacitively coupled capillary discharge driven by an RF voltage at a frequency of 27.12 MHz which is supplied to the upper of both the ring-shaped electrodes attached to the capillary. The lower electrode is grounded. In the active zone between both electrodes, a filamentary plasma is ignited in the argon gas flowing from above through the capillary. In the present contribution, first results of a combined model including the temporal resolution of the RF period and the influence of the gas flow and heating are presented. A curved trajectory representing the filament is obtained which guides the current between the powered and grounded electrodes. Along this path, the electron density reaches values of more than $10^{20}\,\mathrm{m}^{-3}$. The gas flow leads to density profiles of all species which are shifted in downstream direction. Striations are generated from the upstream side and spread in downstream direction. The phase-resolved evolution of the mean energy shows slight modulations in the bulk and large ones in the sheath regions in front of the electrodes.

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