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Phase-resolved modelling of a filamentary argon plasma in an
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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 con-
figured 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 elec-
trodes 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 com-
bined 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 $10^{20}$ 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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