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Modeling of filaments and gas flow in an atmospheric pressure plasma jet[1] FLORIAN SIGENEGER, DETLEF LOFFHAGEN, INP Greifswald, Felix-Hausdorff-Str. 2, 17489 Greifswald, Germany — A non-thermal atmospheric pressure plasma jet is investigated by a combination of different approaches. The jet consists of two concentric capillaries and two ring-shaped electrodes which are twisted around the outer capillary to supply the rf power at 27.12 MHz. One part of the model is devoted to describe one single filament as observed in the active volume between the electrodes. For this purpose a two-dimensional axisymmetric fluid model has been used which comprises continuity equations for electrons and the most important argon species, the electron energy balance equation, Poisson's equation and an equation for the surface charges at the walls of the capillaries. Furthermore, the heat balance equation is solved to determine the temperature of the gas. The inclusion of contraction mechanisms allows to describe the establishment of a constricted filament and even pronounced striations as observed in the experiments. The second part uses results of the first one to model the gas flow through the jet under the influence of local heating at the position of the filament which leads finally to an azimuthal rotation of the filaments as observed in experiments.

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