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**Nonlinear lumped circuit modeling of an atmospheric pressure rf discharge** M. LAPKE, D. ZIEGLER, T. MUSSEN-BROCK, T. GANS, V. SCHULZ-VON DER GATHEN, Center for Plasma Science and Technology CPST, Ruhr University Bochum, D-44780 Bochum, Germany — The subject of our modeling approach is a specifically modified version of the atmospheric pressure plasma jet (APPJ, originally proposed by Selwyn and coworkers<sup>1</sup>) with reduced discharge volume, the *micro* atmospheric pressure plasma jet ( $\mu$ -APPJ). The  $\mu$ -APPJ is a homogeneous nonequilibrium discharge operated with Argon or Helium as the feedstock gas and a percentage volume admixture of a molecular gas (O<sub>2</sub>, H<sub>2</sub>, N<sub>2</sub>). The efficiency of the discharge is mainly due to the dissociated and activated molecules in the effluent that can be selected depending on the application. A variety of applications in surface treatment have already been demonstrated, e.g., in semiconductor technology, restoration and bio-medicine. In this contribution we present and analyze a nonlinear lumped circuit model of the  $\mu$ -APPJ. We apply a two-scale formalism. The bulk is modeled by a generalized Ohm's law, whereas the sheath is described on a considerably higher level of mathematical sophistication. The main focus lies on the spectrum of the discharge current in order to support the characterization of the discharge via model-based diagnostics, i.e., the estimation of the spatially averaged electron density from the frequency of certain self-excited collective resonance modes.

J. Park et al., Appl. Phys. Lett. **76**, 288 (2000)

Prefer Oral Session  
 Prefer Poster Session

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