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Global Model of Atmospheric Pressure Plasmas with Capacitively-Coupled Radio-Frequency Excitation KARI NIEMI, JOCHEN WASKOENIG, Centre for Plasma Physics, School of Mathematics and Physics, Queen's University Belfast, Belfast BT7 1NN, Northern Ireland, UK, DEBORAH O'CONNELL, TIMO GANS, York Plasma Institute, Department of Physics, University of York, York YO10 5DD, UK — Radio-frequency driven atmospheric pressure plasma jets (rf-APPJs) provide a rich non-thermal afterglow chemistry, which offers new opportunities for the treatment of delicate materials, e.g. in biomedicine. A global model for the electron temperature and the electron density in the plasma bulk of such discharges is developed. The concept is based on the balance between the ohmic heating power, absorbed by the electrons, and the corresponding loss through collisions of electrons with heavy particles. The time dependent excitation is considered explicitly in form of a sinusoidal E/N, and the corresponding rate and transport coefficients are calculated with the aid of a two-term approximation Boltzmann-solver. Results for a discharge in helium with 0.5 percent molecular oxygen admixture are presented as well as a comparison with a more comprehensive one-dimensional fluid model for a 1 mm electrode gap.

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