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A hybrid Particle-In-Cell code for atmospheric pressure plasma jets[1] MAXIMILIAN KLICH, Ruhr University Bochum, Bochum, Germany, RALF PETER BRINKMANN, Ruhr University Bochum, Germany, JESPER JANSSEN, PlasmaMatters B.V., Eindhoven, Netherlands, YUE LIU, THOMAS MUSSENBROCK, Brandenburg University of Technology, Cottbus, Germany — To exploit the enormous potential which is inherent to non-equilibrium plasmas operated at atmospheric pressure a throughout understanding of the underlying plasma process is required. In order to contribute to the gathering of information and understanding this work introduces a hybrid code for the simulation of atmospheric pressure plasma jets. The complex chemistry of atmospheric pressure micro discharges is a key feature and from the simulations perspective the major disadvantage as well. The shear number of species leads classical Particle-In-Cell (PIC) codes to struggle with the enormous computational load. Therefore, the computation takes so long that a classical PIC scheme is not feasible in any practical sense. Furthermore, many cross sections are unknown which leads to crude assumptions or, in the worst case, an inapplicable scenario for the PIC scheme. If it is necessary to resolve as many chemical reactions as possible, a fluid model is usually preferred. However, a fluid model cannot resolve all kinetic effects which under certain conditions are the essential mechanisms of the discharge. Hence, the idea of a hybrid model is to treat electrons kinetically and heavy particles as fluid. This work presents details of the hybrid model implementation and recent results.

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