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Modeling of heavy particle collisions in high E/N discharges in helium ZORAN PETROVIC, ZELJKA NIKITOVIC, Institute of Physics Belgrade Serbia, SVETLANA RADOVANOV, Varian Semiconductor Equipment Associates, 35 Dory Road, Gloucester, MA 01930 USA, VLADIMIR STOJANOVIC, Institute of Physics Belgrade Serbia — We have compiled a set of collision cross sections for electrons, ions and fast neutrals in helium. The set has been used as the basis for modeling of heavy particle excitation and other effects that occur at very high E/N. As a first step modeling was performed for Townsend discharges in uniform electric field. We calculate spatial profiles of emission with imprints of both electron and heavy particle excitation and compare them to the experiment. Non-hydrodynamic transport close to electrodes at low pressures is illustrated and effects of reflection of particles, secondary particle emission and surface excitation are included in the model. We also present the spatial profile of fluxes of all particles and we calculate line profiles that show Doppler broadening that may be detected in gas discharges. We also analyze kinetics of electrons, ions and fast neutrals in helium discharges with inhomogeneous electric field.

Zoran Petrovic
Institute of Physics Belgrade

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