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A transition of the electron energy distribution function through ratio of driving frequency to the energy relaxation frequency JUNG YEOL LEE, Pusan National University, JOHN VERBONCOEUR, Michigan State University, HAE JUNE LEE, Pusan National University — Over the past twenty years, atmospheric pressure plasma (APP) devices including sub-millimeter dielectric barrier discharges (micro DBDs) have been developed for plasma medicine. They have great advantage of stable and high density plasmas, but there are still many unknown phenomena of which experimental diagnostics are difficult. In this study, a one-dimensional particle-in-cell simulation with Monte Carlo Collisions (MCC) was adopted to investigate the characteristics of electron energy probability function (EEPF) as a self-consistent kinetic model with no assumptions. Spatio-temporal analysis compares well with theoretical estimation of micro DBDs driven with RF frequencies from 13.56 MHz to 500 MHz in APP. The result indicates that the ratio of the driving frequency to the energy relaxation frequency contributes to the drastic transition of EEPF. The kinetic theory with two-term approximation explains that the electron transport follows the non-local kinetics even in the APP device for specific conditions.

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