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Simulation of mist-containing low-temperature plasma in atmospheric-pressure helium[1] FUMIYOSHI TOCHIKUBO, FUMIYA MURAYAMA, SATOSHI UCHIDA, Tokyo Metropolitan University — Plasma-liquid interaction is a hot topic in the application of atmospheric-pressure plasma (APP). Using mist will be the efficient method to increase the effective area for plasma-liquid interaction. When mist is introduced to the APP, each droplet will be charged negatively, therefore, reductive reaction is expected at the surface of droplet. The evaporation of mist will change the gas composition. The aim of this work is to clarify the physics of mist-containing APP by numerical modeling. First, the evaporation process of the droplet was modeled by the conservation laws of mass and energy for droplets and surrounding gases. Second, the dust plasma in atmospheric-pressure helium was calculated by fluid model with heat equation for gas as parameters of particles diameter and concentration. The APP modeled in this work is dc glow discharge and dielectric barrier discharge. The charge of particle with diameter of 1 mum in APP ranges from 10^3 to 10^4 of elementary charge. At particle concentration greater than 10^7 cm^{-3}, the particles influences the plasma structure as a strong loss term for electrons and ions although the charge density itself is much lower than the plasma density. The simulation with mist is ongoing by combining the above two models.

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