Abstract Submitted
for the GEC20 Meeting of
The American Physical Society

The effect of discharge current, pressure and magnetic field on the radial distribution of the formation of particles and flows in a dusty plasma of a positive column of glow discharge. ZHE DING, SHUBO LI, Department of Physics, Harbin Institute of Technology, Harbin, China, DMITRY BOGDANOV, ANATOLY KUDRYAVTSEV, Saint Petersburg State University, CHENGXUN YUAN, Department of Physics, Harbin Institute of Technology, Harbin, China — Interest in the interaction of plasma with dust particles results from numerous applications in fundamental science and technology. Recently, the effect of dust grains on the gas discharge plasma parameters and the space distributions of particles, fluxes and fields has been studied actively. To investigate this problem, we developed numerical axisymmetric modified extended fluid model of the uniform PC dusty argon plasma of glow discharge. Obtained results allowed us to determine the possibility of strong influence of the spatial distributions of dust particle's density on the plasma parameters and identify the influence of the gas pressure, the current of discharge, and the magnetic field values on the spatial profiles of charged particle's densities, radial fluxes and electric field. For example, different values of the discharge current, as well as the different values of the dust particles density, can lead to the realization of different scenarios of the radial profiles formation, including similar (parallel) and even nonmonotonic particles density profiles, accompanied by the zeroing and reversal of the sign of the ambipolar electric field. At the same time, the mechanisms of transition and realization of nonmonotonic density profiles at high discharge currents and high dust densities are different.

Anatoly Kudryavtsev
Saint Petersburg State University

Date submitted: 10 Jun 2020 Electronic form version 1.4