Interaction of particles with inhomogeneous surface properties in a non-uniform electric field

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Today, there is great interest in studying plasmas and environments containing active particles [1–3], including Janus particles [4, 5], so studying the electrostatic interaction of such particles is of interest. Also, while dust particles are in plasma, their surface properties may change, this may also alter the nature of their electrostatic interaction. Another aspect of the electrostatic interaction of microparticles in dusty plasmas under terrestrial conditions is the presence of a non-uniform electric field in the region of microparticle levitation [6], which also leads to a change in the nature of the interaction and to a change in the conditions of microparticle levitation.
This paper examines the electrostatic interaction of spherical Janus particles and the influence of electric field inhomogeneity in the region of microparticle levitation on their interaction. To simplify the problem, an axially symmetric problem is considered. It is shown that the nature of the free charge distribution and the presence of a uniform or non-uniform electric field lead to significant changes in the nature of the electrostatic interaction of the particles.

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