Electrostatic interaction of Janus particles

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In recent years, a lot of works have been devoted to the study of plasmas and media with active particles [1–3], including Janus particles [4, 5], which are spherical dielectric particles, part of the surface of which is covered with a thin metal film. Therefore, it is of interest to study the electrostatic interaction of such particles, since it is the electrostatic interaction that often determines the behavior of such particles in plasma or electrolytes.

In the present work, studies of the electrostatic interaction of two-layer particles of a spherical shape were carried out. Variants of uniform distribution of the free charge over the entire surface, or over the left or right hemispheres (relative to another particle) of both particles are considered. To simplify the problem, an axially symmetric problem is considered. It is shown that the character of the distribution of free charge, the presence of a polar cap of a thin metal film lead to a significant change in the character of the electrostatic interaction of particles.

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[1] Bechinger C, Di Leonardo R, Löwen H, Reichhardt C, Volpe G and Volpe G 2016 *Rev. Mod. Phys.* **88** 045006
[2] Elgeti J, Winkler R and G G 2015 *Rep. Prog. Phys.* **78** 056601
[3] Ramaswamy S 2017 *J. Stat. Mech.* **2017** 054002
[4] Walther A and Müller A H E 2013 *Chem. Rev.* **113** 5194–5261
[5] Lisin E A, Vaulina O S, Lisina I I and Petrov O F 2021 *Phys. Chem. Chem. Phys.* **23** 16248–16257