

Electrostatics of two dielectric spheres, one of which contains a metal core

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The problem of interaction between charged spherical particles finds many application, among which dusty plasmas, molecular clusters, and aerosols in extraterrestrial atmospheres could be mentioned [1]. In case when one sphere's radius is much greater than the other one's, the considered system can be used as a model for studying interaction between a charged nanoparticle with a wall, which is essential, for example, for atomic-force microscopes calibration [2] and technology of extreme ultraviolet lithography [3].

In this work, we suppose the larger particle to have a conducting concentric spherical core of a radius slightly smaller than such of the entire sphere. In the limiting case, this corresponds to a dielectric sphere interacting with a planar conducting surface with a thin dielectric outer layer. Moreover, we consider that the system is placed in constant external electric field. The problem was solved in spherical and bispherical coordinates, results include data for the net interaction force obtained by these two approaches.

- [1] Munirov V and Filippov A 2013 *Journal of Experimental and Theoretical Physics* **117** 809–819
- [2] Khachatourian A, Chan H K, Stace A J and Bichoutskaia E 2014 *The Journal of chemical physics* **140** 074107
- [3] Krainov P, Ivanov V, Astakhov D, Medvedev V, Kvon V, Yakunin A and van de Kerckhof M 2020 *Plasma Sources Science and Technology* **29** 085013