# Electrostatic interaction of dielectric spheres with significantly different sizes

**Filippov A V**[1,2]

[1] State Research Center of the Russian Federation—Troitsk Institute for Innovation and Fusion Research, Pushkovykh Street 12, Troitsk, Moscow 108840, Russia

[2] Joint Institute for High Temperatures of the Russian Academy of Sciences, Izhorskaya 13 Bldg 2, Moscow 125412, Russia

fav@triniti.ru

The paper considers the electrostatic interaction of two charged dielectric spheres at small distances between their surfaces in the case when the radius of one of which is much larger than the radius of the second. The spheres are located in an uniform dielectric medium (the vacuum), in which there is a homogeneous external electric field. For the first time, analytical solutions are found for the expansion coefficients of the potential for large multipole moments. Exact analytical relations are obtained for the interaction force in the method of potential expansion in a bispherical coordinate system in the case of the coincidence of the dielectric constant of one of the balls with the dielectric constant of the medium in which they are immersed. A transition is made to the case of an infinite radius of a sphere with a dielectric constant different from the dielectric constant of the medium. It is shown that these solutions coincide with the known solutions of problems on the interaction of a point charge with a dielectric ball and with a plane charged boundary of dielectrics. The transition to an infinite radius of one of the balls is made for the case the dielectric constants of both balls are different from the dielectric constant of the medium, and an analytical solution is found for the first time to the problem of the interaction of a charged dielectric sphere with a flat charged boundary of homogeneous dielectrics.

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