

ELECTROSTATICS OF TWO DIELECTRIC BALLS AND A POINT CHARGE

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The problem of electrostatic interaction between charged bodies arises from studying dusty plasmas and electrolytes, molecular clusters, and extraterrestrial atmospheres. A possible approach to model such systems is to consider a pair of charged dielectric spheres. Under this paradigm, researchers explained the phenomenon of attraction between like-charged macroparticles, which is experimentally observed. In this work, we made the first step to take into account the effect of surrounding particles on the pair by adding a third macroparticle to the system. For simplicity, we assumed the third particle as point-like (i.e., non-polarizable) and examined how its position affects the repulsion-attraction transition between the two spheres. We also varied the parameters of the two-particle system to find the configurations for which the effect of the third particle is strongest. Results include data for the net interaction force and bound charge distribution on the surface of the macroparticles that causes the onset of attraction between the spheres.