Physics > Optics

Optical and transport properties of spheroidal metal nanoparticles with account for the surface effect

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The kinetic approach is applied to develop the Drude-Sommerfeld model for studying of the optical and electrical transport properties of spheroidal metallic nanoparticles, when the free electron path is much greater than the particle size. For the nanoparticles of an oblate or a prolate spheroidal shape there has been found the dependence of the dielectric function and the electric conductivity on a number of factors, including the frequency, the particle radius, the spheroidal aspect ratio and the orientation of the electric field with respect to the particle axes. The oscillations of the real and imaginary parts of the dielectric permeability have been found with increasing of particle size at some fixed frequencies or with frequency increasing at some fixed radius of a nanoparticle. The results obtained in kinetic approach are compared with the known from the classical model.

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