CASIMIR-POLDER INTERACTION BETWEEN A DIPOLE AND A CONDUCTING SURFACE BY THE IMAGE METHOD

Edson C.M. Nogueira[1], Danilo T. Alves[2]

[1].Universidade Federal do Pará, Belém, PA, Brasil;
[2].Universidade Federal do Pará, Belém, PA, Brasil.

E-mail: [1] edsoncezar16@gmail.com, [2] danilo@ufpa.br

Abstract

In this work, we study the non-retarded interaction between an electric dipole and a conducting surface using first-order perturbation theory. Employing a method first described by Eberlein and Zietal, we show that the interaction depends only on the expectation value of the squared transition dipole operator and on the homogeneous part of the Green's function of the corresponding classical problem. We, then, show that this part of the Green's function is essentially the classical potential due to the image charges of the problem and explicitly compute this interaction term for some geometries. Finally, we show how we can adapt the method for the case of rough surfaces, which has potential applications in condensed matter.

Palavras-chave: Casimir-Polder interaction, Image method, roughness effects.