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Casimir effect for a stack of conductive planes

Khusnutdinov N., Kashapov R., Woods L.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© 2015 American Physical Society. The Casimir interaction in a stack of equally spaced infinitely thin layers is investigated within the zero-frequency mode summation method. The response properties are considered to be described by a constant conductivity or by a Drude-Lorentz model with a finite set of oscillators consistent with the optical characteristics for graphite. It is found that the asymptotic distance dependence is affected significantly by the specific response. While the energy is ~1/d3 for the constant conductivity model, the energy exhibits fractional dependence ~1/d5/2 for the Drude-Lorentz description. The Casimir force on a plane is also strongly dependent upon the particular plane location in the stack. Furthermore, the calculated Casimir energy within the Drude-Lorentz model yields results in good agreement with measured cohesion energy in graphite.

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