Relaxation of the thermal Casimir force between net neutral plates containing Brownian charges

David DEAN
Laboratoire d'Ondes et Matièred'Aquitaine (LOMA), Université de Bordeaux, France

---

We investigate the dynamics of thermal Casimir interactions between plates described within a living conductor model, with embedded mobile anions and cations, whose density field obeys a stochastic partial differential equation which can be derived starting from the Langevin equations of the individual particles. This model describes the thermal Casimir interaction in the same way that the fluctuating dipole model describes van der Waals interactions. The model is analytically solved in a Debye-Huckel-like approximation. We identify several limiting dynamical regimes where the time dependence of the thermal Casimir interactions can be obtained explicitly. Most notably we find a regime with diffusive scaling, even though the charges are confined to the plates and do not diffuse into the intervening space, which makes the diffusive scaling difficult to anticipate and quite unexpected on physical grounds.