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Radiative heat transfer between two magnetodielectric metamaterial slabs with finite thickness in the non-equilibrium situation

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Abstract

In this paper, we consider a system including two maghnetodielectric slabs with different temperatures that are placed in vacuum at the zero temperature and with very short separation distances from each other. Based on the canonical quantization of the electromagnetic field in the presence of dissipative media, we investigate the radiative heat transfer arising from thermal and quantum fluctuations out of the thermal equilibrium but under the stationary situation. For this purpose, we calculate the ensemble average of the Poynting vector by driving the quantum correlation relations between noise polarization and magnetization operators and extracting the electromagnetic Green tensor of the system. Finally, we analyze the transferred radiation of the aforementioned system by employing the numerical results of the Poynting vector.

Keywords: quantization of the electromagnetic field, radiative heat, electromagnetic Green tensor, propagating and evanescent waves, surface polariton

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