ON OPTIMAL OPTICAL PROPERTIES FOR NEAR-FIELD RADIATIVE HEAT TRANSFER MAXIMIZATION BETWEEN TWO SEMI-FINITE PLANES AT ROOM TEMPERTATURE

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ABSTRACT. A parametric study of Drude and Lorentz models performances in maximizing near-field radiative heat transfer between two semi-infinite planes separated by nanometric distances at room temperature is presented in this paper. Optimal parameters of these models that provide optical properties maximizing the radiative heat flux are reported and compared to real materials usually considered in similar studies, silicon carbide and heavily doped silicon in this case. Results are obtained by exact and approximate (in the extreme near-field regime and the electrostatic limit hypothesis) calculations. The two methods are compared in terms of accuracy and CPU resources consumption. Finally, the frequently assumed hypothesis which states a maximal transfer when the two semi-infinite planes are of identical materials is numerically confirmed. Its subsequent practical constraints are then discussed.