A GENERALIZED MODEL OF THE KAPITZA RESISTANCE

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At present, the problem of the development of the theory of Kapitza resistance between solids is particularly relevant due to growth of nanotechnology, where these resistances play an important and sometimes main role in the heat transport. The theory of acoustic mismatch (AMM) for this phenomenon previously presented in [1,2]. However, this model contains a number of limitations that do not take into account the important properties of acoustic wave propagation in solids. 1) Only longitudinal waves are taken into account. 2) It is not considered that refraction and reflection of acoustic waves cause simultaneously both longitudinal and transverse waves [3, 4]. 3) It does not take into account the phenomenon of total internal reflection, which makes a significant contribution to the Kapitza resistance. These facts significantly change the formulation of the problem, especially, the boundary conditions on the contact surface (interface).

This work presents a new model that takes into consideration all specified properties of acoustic waves. A number of estimations were carried out which show a good agreement with the experimental data, better than in previous works.

Work was supported by Russian Ministry of Science and Education, project 16.8107.2017/6.7.

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