THE INFLUENCE OF INTERACTIONS BETWEEN PHONONS ON HEAT TRANSFER

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The processes of heat transfer in solids are determined by the kinetics of quasi-particles gas called phonons. This is the similarity to the kinetics of classical gases. However, the nature of phonon interactions is much more complex than the interactions of atoms and molecules. First of all, there are a large number of factors affecting phonon kinetics [1, 2]. Such as 1) triple interaction of phonons, accompanied by their merger or decay. 2) Existence of different types of phonons. 3) Availability of different types of interaction processes with phonons. 4) Mean free path of phonons have various dependences on the energy for different polarization types. 5) Another important subject is the phonon interactions with impurities and imperfections of the crystal structure. It is interesting to estimate the relative contributions of these factors to the intensity and nature of heat transfer depending on the temperature of the solid.

In this work, the analysis of listed factors is based on a specially developed code using the Monte Carlo method.

The obtained results are necessary to get more information about the complex processes of heat transfer in solids and to develop the tools that can solve relevant thermal transport problems using Monte Carlo method.

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2. Klemens P.G. // Solid StatePhys. – Adv. Res. AppI. 1958. Vol. 7:1-98.