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Thermal conductance quantization in a T-junction[1] KEIVAN ESFARJANI, Department of ME, MIT, Cambridge, MA, NATALIO MINGO[2], CEA, France — In this work, we have investigated transmission of phonons through a T-junction connecting a bulk material to a nanowire. This quantity determines the interface thermal conductance of the device and is relevant in the observation of the quantization of thermal conductance. The Green's function method is used to derive the frequency-dependence of the transmission coefficient calculated within Caroli et al's formalism. To get the frequency-dependence, we first adopt a simple nearest neighbor spring model and ca lculate the contribution of both linear acoustic and quadratic flexural modes of the wire, as well as the effect of the dimensionality of the bulk structure. More importantly, we also investigate the effect of the smoothness of the juntion on the transmission. It is found that 2D structures smoothly connected to the wire can have a finite transmission at low frequencies if their width is finite. This will lead to a quantization of thermal conductance but not necessarilty in integer multiples of the quantum of thermal conductance. Finally, results for a junction between bulk graphene and a graphene nanoribbon, using realistic force constants derived from first-principles density functional theory will be shown.

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