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Tunneling of Heat: Potential-Barrier Analysis. DAVID SAROKA, KAMIL WALCZAK, Pace University — We examine quantum processes of heat (energy) transfer as carried by electrons tunneling via potential barriers of different shapes. As a starting point, we use analytical expressions for transmission functions related to rectangular and triangular potential barriers as well as point-like defects connecting two heat reservoirs (thermal baths). To calculate thermal conductance, we use Landauer formula for heat flux in its linear Taylor expansion with respect to temperature difference. Our results are discussed with respect to temperature, resonant states, specific parameters characterizing potential barrier (its height and width), and the effective mass of heat carriers. To get time-dependent heat fluxes reflected from and scattered on potential barriers, we use Gaussian-type wave-packet approach to tunneling of heat carried by electrons. Time-domain formulation of the scattering problem is performed by using the quantum mechanical concept of Gaussian wave packets.

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