

## Grad-Type Expansion About Nonequilibrium States for the Relaxion-Time Approximation of the Boltzmann–Peierls Equation

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A new type of heat transport equations for transient processes under high thermal loads is derived from the microscopic, kinetic-theory description of a phonon gas. The Grad-type expansion of the phonon distribution function about the nonequilibrium anisotropic Planck distribution (called drifting distribution) is applied to the two-relaxation-time approximation of the Boltzmann–Peierls kinetic equation. Substitution of the truncated expansion into the corresponding system of moment equations results in a closed system of the evolution equations for the moments which involves two relaxation times, is nonlinear in the energy and in the heat flux, and depends linearly on the higher-order moments of the distribution function. Thus, the obtained theory conforms to the two time scales of the phonon gas relaxation processes and admits arbitrarily large heat fluxes.

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