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General constitutive equations of heat transport at small length scales and high frequencies with extension to mass and electrical charge transport. (English) Zbl 1330.80005


Summary: A generalized heat transport equation applicable at small length and short time scales is proposed. It is based on extended irreversible thermodynamics with an infinite number of high-order heat fluxes selected as state variables. Extensions of Fick’s and Ohm’s laws are also formulated. As a numerical illustration, heat conduction in a rigid body subject to fixed and oscillatory temperature boundary conditions is discussed.

MSC:
80A20 Heat and mass transfer, heat flow (MSC2010)
80A10 Classical and relativistic thermodynamics

Keywords:
ballistic heat transport; small length-systems; high-frequency; extended irreversible thermodynamics

Full Text: DOI

References:

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