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Fundamental Inequalities for the Bounds on the Effective Transport Coefficients of Two-Phase Media

Stanisław Tokarzewski[(1)], Józef Joachim Telega[(1)], J. Gilewicz[(2)]

(1) *Institute of Fundamental Technological Research Polish Academy of Sciences, Warsaw, Poland*
(2) *Centre de Physique Théorique, CNRS, Marseille, France*

By using a special multipoint continued fraction technique we derive, starting from the truncated power expansions given at a number of discrete real points, the general inequalities for the effective transport coefficients Q of macroscopically isotropic two phase media. The inequalities obtained provide new upper and lower bounds on Q, the best ones with respect to rational functions and the available power series coefficients. In particular cases these new bounds reduce to the classical ones of Wienner and Hashin-Shtrikman. They also coincide with the estimations due to Milton and Bergman obtained for the fitting problem. Many illustrative examples clearly show the usefulness of the new bounds derived.

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