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Macroscopic Relations for Nonlinear Thermodiffusion in Heterogeneous Elastic Medium

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Thermodiffusion in heterogeneous elastic body with periodic microstructure in the case of temperature (T) and concentration (c)dependent phenomenological coefficients is considered. The primal system of equations describing the thermodiffusion in such a nonlinear elastic composite is derived on thermodynamical basis. Next, by using homogenization methods macroscopic coefficients are derived. The special cases of linear dependence of coefficients on T and c, as well the case of the Arrhenius and non-Arrhenius temperature dependency are studied. To illustrate the general results, the microperiodic layered composite is studied and exact analytical formulae for the overall coefficients are obtained.

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