Dependence of the effective thermal conductivity of periodic composites on the diameter of inclusions

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We discuss the effective thermal conductivity of a two-phase dilute composite and its dependence on the diameter of inclusions. The composite is obtained by introducing into an infinite homogeneous matrix a periodic set of inclusions of a different material. The diameter of each inclusion is proportional to a real positive parameter ϵ. We assume the continuity of the normal component of the heat flux and the temperature field at the two-phase interface.

We will show that the effective conductivity can be represented as a convergent power series of ϵ and we will compute some coefficients of such series.

Keywords: effective conductivity, transmission problem, singularly perturbed domain.