Homogenization of the functionally-graded materials

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Abstract: Exact and asymptotic solutions of the problems related to a steady-state thermal fields as well as stress and strain fields of the rod made from functionally-gradient material are given. Comparison of these solutions allows to estimate accuracy of the asymptotic solutions and to determine their application limits. The purpose of this paper is to evaluate the accuracy and applicability of some known method to calculate the physical fields in FGMs. To this end, we consider the particular problem that admits an exact solution. The carried out investigation has shown high efficiency of the developed modification of the asymptotic homogenized method to calculate various physical fields occurred in structures consisting of FGMs. The accuracy of a homogenized solution depends on the magnitude of heterogeneity, i.e. of the ratio of the characteristics of grain and binding material.

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