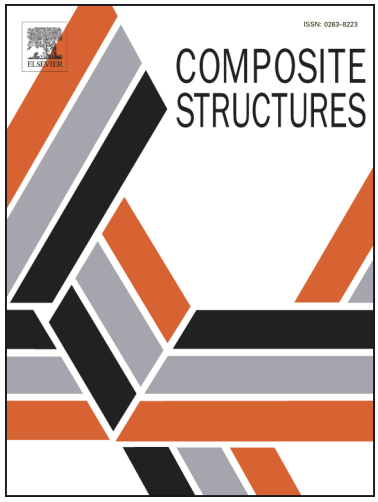

An analytical method for predicting the effective transverse thermal conductivity of nano coated fiber composites

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An analytical method for predicting the effective transverse thermal conductivity of nano coated fiber composites

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Abstract: A four-phase concentric cylinder model with interface effect is proposed. Based on the model and surface/interface theory, a generalized self-consistent method is developed for predicting the effective transverse thermal conductivity of nano coated fiber composites. An analytical solution is obtained for effective thermal conductivity by applying complex elastic theory. Comparisons with the finite element analysis (FEA) and other available theoretical methods show the efficiency and the accuracy of the present method. Numerical results show the dependence of the effective thermal conductivity of the nano composites when the size of fiber and coating are on the order of nanometer. The effects of the interface thermal constant and the coating thermal conductivity on the effective thermal conductivity are discussed. The present solutions are useful to the theoretical research and engineering applications of the nano coated fiber composites.

Key words: Effective transverse thermal conductivity; nano composites; coated fiber; interface effect; size dependence

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