

Calculation of the effective thermal conductivity in composites using finite element and Monte Carlo Methods

Abstract

In this paper, the Finite Element and lattice Monte Carlo methods are used to calculate the effective thermal conductivity of two models of a composite: circular and square inclusions arranged in a square planar arrangement. A new lattice Monte Carlo method based around Fick's First Law is also presented. Excellent agreement is found between these quite different methods. It is also shown that the results are in excellent agreement with the century-old Maxwell Equation.