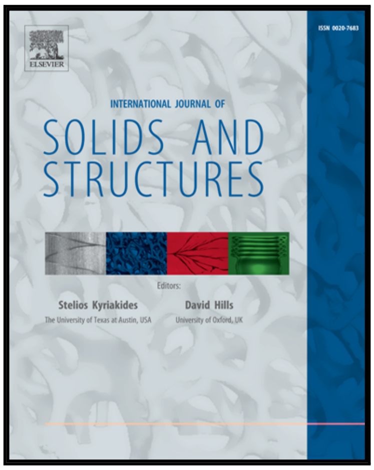

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Extension of Maxwell homogenization scheme for piezoelectric composites containing spheroidal inhomogeneities

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Abstract

In this work, an analysis of static properties of piezoelectric composites is considered. The paper focuses on the extension of classical Maxwell's homogenization technique [1] for electro-elastic composites. The composites are composed by a set of spheroidal inclusions with identical size and shape, aligned in the same direction whose center is randomly distributed and embedded in a homogeneous infinite medium (matrix). The inclusions and matrix materials exhibit piezoelectric transversely isotropic symmetry. The overall electro-elastic properties for piezoelectric composite materials are computed using the Maxwell homogenization method (MHM). The method allows to report the overall static piezoelectric coefficients in composites with inclusions of different geometrical shapes embedded within passive or active matrix. Numerical results are compared with some other theoretical approaches and experimental data.

Keywords: Maxwell's method; Homogenization; Piezoelectric material; Static properties.

1. Introduction

The Maxwell scheme appears to be one of the best homogenization techniques in terms of its applicability to cases of anisotropic multiphase composites and accuracy. In his original work, [1] considered the effective conductivity of a matrix of conductivity k_0 containing spherical inhomogeneities of conductivity k_1 and volume fraction θ. He considered a sufficiently large spherical domain possessing the yet unknown effective conductivity k_{eff} embedded in the background ma-

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