Homogenized properties for multiscale analysis of unidirectional composite laminates using boundary element method

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Abstract

This paper presents a formulation to evaluate the homogenized properties of unidirectional composite laminates based on boundary element method for multiscale analysis. The micromechanical approach (local scale) assumes a Representative Volume Element (RVE) composed by a transversely isotropic fiber within of an isotropic matrix, having the your orientation according to orientation of fibers in the composite laminate (global scale). The multi-domain Boundary Element Method (BEM) formulation is applied to the RVE elastic problem in conjunction with the mean fields theory in order to evaluate the effective properties of the laminate. Numerical examples are presented and the homogenized constitutive properties are compared with the respective properties of composite laminate, found in the literature.

Keywords: Composite Laminates, Multiscale Analysis, Boundary Element Method, Representative Volume Element, Mean Fields Theory

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