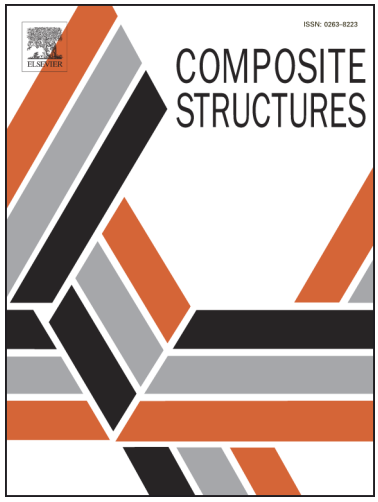

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Peridynamic unit cell homogenization for thermoelastic properties of heterogenous microstructures with defects

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Abstract

This study concerns the development of a peridynamic unit cell to predict the effective thermoelastic properties of micro-structures in the presence of many defects and voids, and complex heterogeneity. It permits arbitrary number of constituent materials as well as voids and cracks. The constituent materials can be orthotropic Voids and cracks can be modeled by simply breaking the peridynamic bonds between the material points. The periodic boundary conditions are applied in a natural way without any constraint conditions. Also, it leads to the determination of a damage matrix necessary for progressive failure analysis. The numerical results concern the verification of this approach by comparison with those reported in the literature, and its capability in the presence of many matrix cracks and debonds along the fiber-matrix interface.

Keywords: Peridynamics; homogenization; unit cell; microstructure; heterogeneous;composites

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