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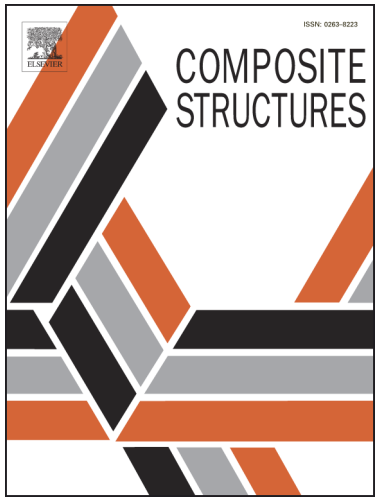

Three-scale modeling of laminated structures employing the seamless-domain method

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Abstract (100-150 words):

We present three-scale modeling of multilayered structures consisting of heterogeneous layers. The presented laminated model is not based on the so-called lamination theory or assumption related to the theories. The framework is based on the multiscale seamless-domain method and homogenization theory. First, we conduct homogenization analysis of the heterogeneous laminate and regard it as being composed of the homogenized anisotropic layers (i.e., the microscopic analysis). Second, we analyze the laminate using the multiscale seamless-domain method (i.e., the mesoscopic and macroscopic analyses). We present numerical examples of heat conduction and elastic deformation for fiber-reinforced composite laminates. In all examples, the proposed multilayered models represented by a small number of points provided solutions as accurate as those of ordinary finite-element models having many nodes.

Keywords (up to 6):
Multiscale; Laminate; Homogenization; Meshfree methods; Linear elasticity; Heat conduction

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