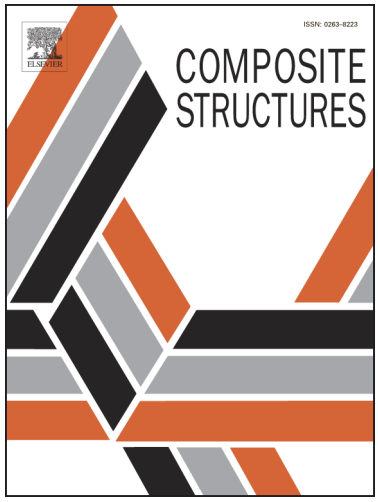

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On Modeling and Analysis of Effective Properties of Carbon Nanotubes Reinforced Materials

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Abstract

Two new aspects related to analysis of Carbon Nanotubes Reinforced Materials (CNTRM) are emphasized in this work. First, a modeling methodology allowing for presence of interphases is proposed. Second, the physically expected dominance of the axial stiffness of Carbon Nanotubes (CNT) on the effective properties of CNTRM is demonstrated by purposefully selected numerical experiments. In the proposed model the Gutrin-Murdoch theory is applied to a hollow cylinder of finite thickness and combined with the notion of energy equivalence to replace CNT with an equivalent solid cylinder. The interphase – modeled as a spring layer – is subsequently added to obtain another equivalent solid cylinder. Effective properties of CNRTM are evaluated using the Method of Conditional Moments.

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