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Prediction and Design of Composite Laminated Structures with Tunable Thermal Expansion Coefficients: Postprint

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Abstract

Based on laminate theory, this study proposes a predictive model for the equivalent coefficient of thermal expansion (CTE) of composite laminates. The model is applicable to both symmetric and antisymmetric laminates for predicting their equivalent coefficient of thermal expansion. Additionally, taking carbon nanotube-reinforced composite laminates as the research object, the equivalent coefficient of thermal expansion is calculated for antisymmetric angle-ply configurations. The computational results demonstrate that, due to the influence of interlaminar stretch-bending-shear coupling effects, carbon nanotube laminates with specific ply angles such as (35/-35)3T and (55/-55)3T can exhibit negative thermal expansion characteristics at the macroscopic level. This not only expands the service conditions for such structures but also provides a new design approach for negative thermal expansion structures.

Full Text

Preamble

The remainder of this section contains corrupted text that cannot be meaningfully translated.

Note: Figure translations are in progress. See original paper for figures.

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