MS1S_12011

XXI International Congress of Theoretical and Applied Mechanics
Warsaw, Poland, August 15–21, 2004

Thermal Buckling of Active Composite Plates with Shape Memory Alloy Fibers

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Micromechanically established constitutive equations for unidirectional composites with shape memory alloy fibers embedded in polymeric or metallic matrices are derived. These equations are subsequently employed to analyze the thermal buckling of rectangular composite plates. The shape memory alloy fibers are activated by a mechanical loading and unloading of the composite to an overall traction-free state, prior to the application of the thermal load. The present micro-macro-structural approach enables an accurate modelling that accounts for the interaction of shape memory alloy fibers with its surrounding rather than the commonly adopted simplified analyses.

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