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Finite Element Fracture and Buckling Analysis of Hybrid Composite Plate with Crack

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Summary

The Fiber/Epoxy/Aluminum hybrid composites are one of the promising materials for aerospace applications. Weight reduction in case of aerospace industries is one of the major focus and thus many research activities have been performed to reduce weight and improve overall material properties. Fracture, Buckling and vibration analyses are performed on Fiber/epoxy/Aluminum hybrid composite with interfacial crack under thermal loading , mechanical loading and mixed thermal and mechanical loading environment using finite element method with varied thickness of prepeg (Fiber/epoxy) and metal (Aluminum 2024 alloy) sheet. ANSYS 10.0 has been used to perform non linear thermal and structural analysis followed by buckling and modal analysis are performed to understand materials behavior under thermal and mechanical loading environment with varying outer layer aluminum and prepeg (fiber/epoxy) thickness and thus fracture toughness is evaluated to understand the materials buckling and fracture behavior and correlate it with change in thickness of outer layer of metal (Aluminum 2024) sheet and inner prepeg layer.

Buckling frequency and natural frequency along with stress intensity factor and energy release rate have been evaluated for different loading mode and different thickness and try to develop relationship between change of crack length and buckling frequency and fracture parameters, layer thickness and buckling and fracture parameters.

keywords: Buckling Analysis, fracture parameters, hybrid composites, thickness change

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