

## **A Composite Beam Element Based on Global-Local Superposition Theory for Prediction of Delamination in Composite Laminates**

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**Abstract :** An interlaminar damage model is combined with a beam element formulation based on global-local superposition to assess delamination in composite laminates. The variations in the mechanical properties in the laminate, generated by the presence of delamination, are calculated as a function of the displacements in the interface layers. The global-local superposition of displacement fields ensures the zig-zag behaviour of stresses and displacement, and the number of degrees of freedom (DOFs) is independent of the number of layers. The displacements and stresses are calculated as a function of DOFs commonly used in traditional beam elements. Finally, the finite element(FE) formulation is extended to handle cases of different thicknesses, and then the FE model predictions are compared with results obtained from analytical solutions and commercial finite element codes.

**Keywords :** delamination, global-local superposition theory, single beam element, zig-zag, interlaminar damage model

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