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# ONE-DIMENSIONAL CUF MODELS FOR THE ANALYSIS OF LAMINATED STRUCTURES

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In this paper, static and dynamic analyses of thin-walled laminated structures are carried out by using advanced beam theories. The refined displacement models are obtained by means of Carrera Unified Formulation, which allows to formulate refined theories by approximating the displacement field with generic functions of the cross-section coordinates (x,z). The choice of the displacement expansions determines the kind of the beam theories, which can be either a Equivalent Single Layer (ESL) or a Layer-Wise (LW) approach. The ESL and the LW models are here obtained adopting Taylor-like expansions and Lagrange functions, respectively. The Finite Element method (FE) is used to solve the governing equations in the weak form. A number of numerical problems using both Taylor and Lagrange models of laminated beams are addressed. Both static and free-vibration analyses have been performed on complex structures such as box beams with open and closed cross-sections considering different lamination sequences, boundary conditions and load configurations. The numerical results are compared with those available in the literature and with shell/solid FE-solutions from the commercial code MSC/NASTRAN. It is observed that the present models are very accurate and provide a 3D-like solution with minimum computational efforts.

## REFERENCES

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