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Response of VSCL plates under moving load using a mixed integral-differential quadrature and novel NURBS based multi-step method

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Abstract

Three-dimensional (3D) dynamic response of variable stiffness composite laminated (VSCL) plates with curvilinear fibers under a moving load is investigated. By applying a hybrid numerical approach composed of the Layerwise-differential quadrature method (LW-DQM) and integral quadrature method (IQM), the equations of motion are discretized in the spatial domain. This results in a system of ordinary differential equation (ODE) in temporal domain. Subsequently, a novel multi-step technique based on the non-uniform rational basis spline (NURBS) curves is developed to obtain solution for the resulting system of ODE. It is demonstrated that the new multi-step technique in comparison with the well-known Newmark method has simple formulation, low computational cost and high accuracy.

Keywords: A. Laminates; C. Computational modeling; Curvilinear fiber; Multi-step method.

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