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A unified quasi-3D HSDT for the bending analysis of laminated beams

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Abstract

This paper presents a static analysis of laminated cross-ply beams by using an unavailable unified higher order shear deformation theory (HSDT) for composite beams which includes the thickness stretching effect. The generalized governing equations are derived by employing the principle of virtual work. Navier-type closed-form solution is obtained for several beams subjected to several kinds of loads (sinusoidal, uniform, linear and point load). Infinite HSDTs for beams can be further developed just by modifying the shear strain shape functions. Several hybrid type shear strain shape functions were introduced to evaluate the generality of the proposed theory. The stretching effects for the accurate prediction of the transverse stresses are analyzed. Numerical results of some HSDTs for beams are compared with the elasticity solutions and other HSDTs. Convergence studies were carried out to determine the necessary half-wave number for the different models.

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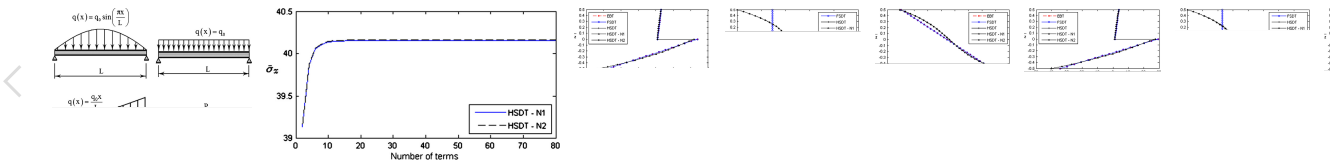

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