



Free vibration analysis of composite and sandwich plates by alternative hierarchical finite element method based on Reddy's C1HSDT

Journal:	<i>Journal of Sandwich Structures and Materials</i>
Manuscript ID:	JSSM-14-0088.R1
Manuscript Type:	Standard Article
Date Submitted by the Author:	30-Mar-2015
Complete List of Authors:	SERDOUN, Nadjib; University of Tlemcen, Department of Mechanical Engineering Hamza Cherif, Sidi Mohamed; University of Tlemcen, Department of Mechanical Engineering
Keywords:	Free vibration, Thick composites plates, hierarchical finite element method, third order C1 HSDT, Sandwich plate
Abstract:	This paper presents the free vibration analysis of composite thick rectangular plates, based on Reddy's higher order shear deformation theory (HSDT). The plate theory ensures a zero shear-stress condition at the top and bottom surfaces of the plate and do not requires a shear correction factor. To overcome the problem of C^1 continuity associated with the HSDT, a new C^1 -HSDT p-element with eight degrees of freedom per node is developed and used to find natural frequencies of thick composite plates. The formulation is easily implemented into simple and efficient finite element programs in which the trigonometric hierarchical shape functions are used. A fast convergence and excellent agreement with the known results in the literature has been obtained using only one element. Besides, the effects of the boundary conditions, core to face sheet thickness ratio, Young's modulus ratio on the natural frequencies were investigated through the analysis of these numerical results.