Article Abstract

Title:	Numerical and experimental investigation of bolted joints
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Abstract:	In this study, the behavior and the damage caused in the bolt joints in sandwich structures with laminates made of glass fiber and foam core is investigated. Many investigators have studied the strength of mechanically bolted joints in composite structures but there is less in sandwich structures. It is performed on a fully composite airplane at the connection area of the wing to the fuselage and the landing gear. The area around the joint is surrounded by the laminates from glass layers (solid laminate) and its thickness is equal to whole thickness of sandwich panel. Different states of connection between the solid laminates, where the bolt connection is imbedded are studied. Also, the foam core around the connection is studied and the dependence of the magnitude of damage on various parameters like the connection angle, size, and the general shape of the solid laminate on buckling is evaluated. For considering the bolted joint performance, a three dimensional finite element model has been developed by ANSYS commercial code. Two proposed circular and squared shape of solid laminate has been considered. The results indicate that the squared shape as compared circular design will decrease the damage significantly. The best solid laminate interface angle (θ) which decreases the damage obtains 45° and solid laminate length is not effective in damage value. Eventually, the effect of these parameters on the local buckling due to the concentrated loading applied to the bolt connection in the sandwich structure is investigated. For confirming the analytical outcomes some experimental models were performed. For testing the analytical results a fixture has been designed. The results of the tests show that the results of the finite element analysis and those of the experimental results are closely related.
Keywords:	Sandwich Structures, Bolted Joint, Finite Element Method, Solid Laminate