Static Strength Analysis for Aluminum Honeycomb Sandwich Structures under Bending Loading

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Abstract

The four-point bending strength for aluminum honeycomb sandwich plates was experimentally analyzed. The effect of the cell size, height of the core, and thickness of the face sheets on the strength of honeycomb sandwich structures was studied. The load-deflection behavior was investigated by evaluating the load-deflection diagram that reveals three regions of increasing loading-deflection, rapid load decrease and moderate load decrease, respectively. It is shown that the ultimate strength of a honeycomb sandwich structure can be increased by the use of higher core, smaller cell size, and thinner face sheets. The failure behavior was also observed during the tests. The interfacial shear debonding between the cell and the face sheet is found to be the major failure mode. Besides, finite element method was employed to describe the stress/strain and deformation behavior during the first region. A good correlation is obtained by comparing the numerical results with the experimental data.

Keyword：Honeycomb Sandwich；Ultimate Strength；buckling；Debonding