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Modeling of Fire Resistance of Polymer Composite Sandwich Structure Covered by Aluminum Sheets

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Abstract

Sandwich structures are increasingly used in high-performance engineering application because of their high specific stiffness, strength, environmental resistance and thermal insulation characteristics. However, poor fire resistance is a critical problem for the use of sandwich structures in engineering applications. Many studies of different approaches of enhancing flame retardant of sandwich composite material were presented and different thermal models that allow the simulation of the fire resistance of composite materials was made. The Gibson thermal model was chosen to simulate a case using ABAQUS software. The sheet of aluminum is used as a fire retardant of the vinyl ester/glass composite. However, the aluminum is high conductive of heat so air gaps are inserted between the sandwich material and the aluminum to decrease the thermal conductivity of heat, then increase the fire resistant of material. As results, the costumer can choose the appropriate thickness of aluminum and air depends on the time needed before the softening of the material.

Keywords: Gibson thermal model, fire retardant, vinyl ester/glass composite, air gap, thermal simulation