A SIMPLE METHOD TO PREDICT DIFFERENT FAILURE MODE OF SANDWICH COMPOSITE PANEL WITH HONEYCOMB CORE: APPLICATION TO MARINE STRUCTURE

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Marine, automotive and aerospace industries are continually trying to optimize material performance in terms of strength and weight. Success has been achieved through the growth of
high performance materials including fibrous composites such as ceramics, new alloys, carbon fiber composites and through the use of structural concepts such as sandwich composite panel
construction. Sandwich composite panel construction with honeycomb core consists of three components: two facing sheets, the core that fill the space between the facing sheet and the core-to-facing bonding adhesives.
The facing sheets of a sandwich panel can be compared to the flanges of an I-beam element, as they carry the bending stresses to which the beam is subjected. With one facing sheet in compression, the other is in tension. Similarly the honeycomb core corresponds to the web of the I-beam that resists the shear loads and vertical compressive load to the face sheet. The core-to-skin adhesive rigidly joins the sandwich components and allows them to act as one unit with a high torsional and bending rigidity. Although the sandwich panels present a good strength to weight ratio and many other interesting mechanical characteristic and advantages, they have some disadvantages. Over the past 40 years, considerable work has been devoted to understanding these problems and trying to predict failure loads in damaged and undamaged panels accurately [2, 1].
This paper discusses the theoretical and quantitative design and analysis of a honeycomb panel
sandwich structure. The initial design is based on specific requirements that the panel must achieve prior to failure under load. Materials to be used for the facing and core are selected based on the given requirements. With the materials chosen, the facing sheets and core are analyzed for failure. Failure occurs when the stresses in the panel exceed the properties of the materials by any mode. The composite panel was modeled by a long beam under flexure test specimen as a simply supported beam loaded in pure bending.
In this paper, we present a simple model for prediction of different failure mode of face sheet and core material. The obtained results of this model were compared with experimental results [3] and present that it is a simple and good model.

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