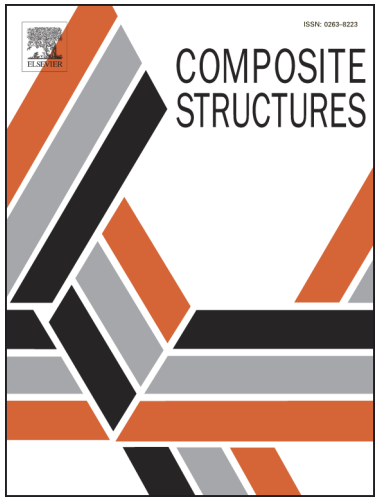

Effects of Shear Loading on Stress Distributions at Sections in Thick Composite Tubes

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Effects of Shear Loading on Stress Distributions at Sections in Thick Composite Tubes

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Abstract

In a previous study [1], a new simple-input displacement-based method (based on layerwise formulation) was developed for the stress analysis of thick composite straight tubes subjected to cantilever loading. This method provides a quick, convenient and accurate method for the determination of 3D stresses in thick composite tubes subjected to both bending and shear loading. The technique in this method is now used to study the behavior of stress distributions in thick composite tubes with different lay-up sequences considering effects of the shear load part of cantilever loading. Knowledge is extracted from the parametric study showing effects of the orientations of different layers on the stresses.

Keywords: Shear load; Lay-up sequences; Thick composite cantilever straight tubes; Stress distribution; General displacement field.

1. Introduction

Composites have many applications due to the properties which they provide with the essential advantages over other materials. In many examples, composite materials are the correct answer if designed, manufactured and used properly. Composites have specific advantages in many areas when their properties are designed into the ultimate product. The important thing is to use composite materials' uniqueness to get the best designs. However, over the years it has been learned that using composites for efficient structural parts requires composites to be designed and manufactured with sound engineering judgment. One type of composite structures is tube which is frequently used in many engineering applications. In order to develop design guidelines, understanding effects of lay-up sequences on stresses, strains and deformations of composite structures is essential.