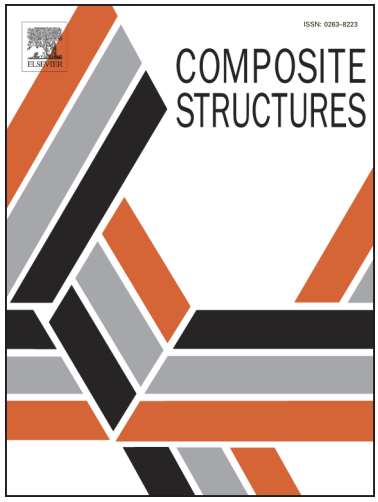

Stress analysis of adhesive-bonded tubular-coupler joints with optimum variable-stiffness-composite adherend under torsion

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Stress analysis of adhesive-bonded tubular-coupler joints with optimum variable-stiffness-composite adherend under torsion

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This paper is dedicated to the memory of HM King Bhumibol Adulyadej, whose great royal duties for millions of Thai citizens have always instilled conscientiousness into us.

ABSTRACT

In this paper, a mathematical model of an adhesive-bonded tubular-coupler joint with a variable-stiffness composite coupler is formulated. The joint is assumed to be axisymmetric, linearly elastic, and subjected to a uniform torsion. Due to symmetry the joint is considered as a pair of two identical tubular-lap joints. Varying fiber orientation is analyzed by discretizing a tubular-lap joint into a finite number of sufficiently small segments, each of which can be approximated to have constant fiber angle. Stresses developed in the joint are determined by employing elasticity equations. This model is applied to search for the optimal variable-fiber-orientation in the coupler that induces the minimum adhesive hoop shear stress. Finally, the influence of geometries of the optimum joint on all of the stress components in the adherends and adhesive stresses is studied. A design guideline for the optimum coupler joint is provided at the end of the paper.

Keywords Adhesive-bonded tubular joint; Variable stiffness composites; Torsion; Stress Minimization; Elasticity

[1] Corresponding author information can be added as a footnote.