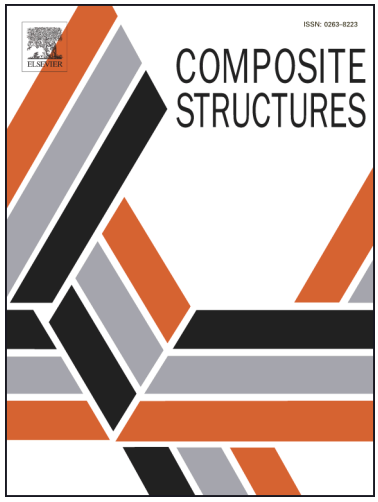

Study on strength and defect detection capability of bonded joints according to cnt content

Woo-Jin An, Cheol-Hwan Kim, Tae-Hyeong Kim, Jin-Ho Choi

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STUDY ON STRENGTH AND DEFECT DETECTION CAPABILITY OF BONDED JOINTS ACCORDING TO CNT CONTENT

Woo-Jin An[*], Cheol-Hwan Kim[*], Tae-Hyeong Kim[*] and Jin-Ho Choi[*+]

[*]School of Mechanical and Aerospace Engineering, ReCAPT
Gyeongsang National University, Jinju, Gyeongnam 660-701, South Korea
[+]Corresponding author: choi@gnu.ac.kr

Abstract. Adhesive bonding method is widely used as a typical joining method for composite structures. The adhesive bonding method exhibits excellent performance in terms of fatigue properties because the load is distributed over a large area as compared to that in the mechanical fastening method. However, the strength of the bonded joint is sensitively influenced by environmental conditions and the skill of the operator. Therefore, there is a need for technique for evaluating and continuously monitoring the integrity of the bonded joint. The impedance method is a promising technique for detecting defects, where carbon nanotubes (CNT) are dispersed in an adhesive and the electrical characteristics between the adherends of the bonded joint are measured. In this study, two types of the aluminum-to-aluminum single-lap bonded joints (one thin and one thick adherend) were fabricated, and their static strengths and failure modes were evaluated according to variations in the CNT content. In addition, the defect detectability of the bonded joints with CNTs using the impedance method was evaluated.

Keywords: Carbon nanotubes, Impedance method, Bonded joint, Surface defect detection

1. Introduction

The adhesive bonding method is widely used as a typical joining method for composite structures. The adhesive bonding method exhibits excellent performance in terms of fatigue properties because the load is distributed over a large area as compared to the mechanical fastening method. However, the strength of the bonded joint is sensitively influenced by environmental conditions and the skill of the operator [1, 2]. Therefore, there is a need for technique for evaluating and continuously monitoring the integrity of the bonded joint.

There are several methods for detecting the defect in the bonded joint such as ultrasonic, laser generated ultrasonics, acoustic emission, and electric impedance [3–7]. The ultrasonic test, which measures the energy, duration time, and attenuation of the pulse echo, has been