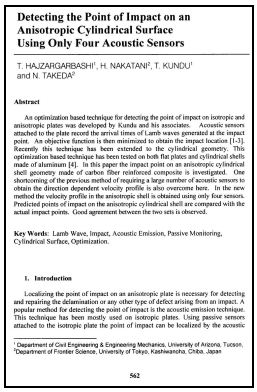

Detecting the Point of Impact on an Anisotropic Cylindrical Surface Using Only Four Acoustic Sensors

T. HAJZARGARBASHI[1], H. NAKATANI[2], T. KUNDU[1] and N. TAKEDA[2]

Abstract

An optimization based technique for detecting the point of impact on isotropic and anisotropic plates was developed by Kundu and his associates. Acoustic sensors attached to the plate record the arrival times of Lamb waves generated at the impact point. An objective function is then minimized to obtain the impact location [1-3]. Recently this technique has been extended to the cylindrical geometry. This optimization based technique has been tested on both flat plates and cylindrical shells made of aluminum [4]. In this paper the impact point on an anisotropic cylindrical shell geometry made of carbon fiber reinforced composite is investigated. One shortcoming of the previous method of requiring a large number of acoustic sensors to obtain the direction dependent velocity profile is also overcome here. In the new method the velocity profile in the anisotropic shell is obtained using only four sensors. Predicted points of impact on the anisotropic cylindrical shell are compared with the actual impact points. Good agreement between the two sets is observed.

Key Words: Lamb Wave, Impact, Acoustic Emission, Passive Monitoring, Cylindrical Surface, Optimization.

1. Introduction

Localizing the point of impact on an anisotropic plate is necessary for detecting and repairing the delamination or any other type of defect arising from an impact. A popular method for detecting the point of impact is the acoustic emission technique. This technique has been mostly used on isotropic plates. Using passive sensors attached to the isotropic plate the point of impact can be localized by the acoustic

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Ключевые слова:
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Содержание.