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Experimental Research on Damage Detecting of Composite Materials with FBG Sensors under Low Frequency Stimulation

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Abstract

The paper discusses the problems about how to use FBG sensors to detect the composite specimens' internal damage under low frequency stimulation. Through the comparison analysis of vibration test of two different kinds of man-made damage and undamaged cantilever beam specimens embedded with FBG sensors. FBG measurement parameters which can reflect the location and degree of damage in the process of the measuring are got. Finally, in contrast with the theoretical results and ANSYS results, and by the analysis of strain deviation, the feasibility and range of the method by using FBG sensors for damage monitoring of composite material specimens can be verified.

Keywords: Low frequency, Composite material, FBG sensors, Damage detecting

1. Introduction

Carbon fiber, glass fiber and other composite materials have been widely used in the aerospace field, but there remain many problems in terms of the structural health monitoring to be solved. Some defects and damage will be made when the fiber reinforced composite structures are in the process of using and producing, and the technology incompleteness and fatigue stress are the main reasons to cause the damage. In addition, since the anisotropy and non-uniformity of composite materials, makes its sensitivity to the crack damage far lower than other materials, the damage and the destruction of the composite material are accumulated in the process of fatigue slowly. But when it arrives a certain extent, the delaminating, fracture and other damages will appear

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