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Damage Monitoring Based on Wave Illumination of Structures

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In this communication, we present a non destructive damage (e.g. static load on the surface) detection method based on the diffraction of Lamb waves. A() mode Lamb waves are transmitted in permanence by piezoelectric transducers into a mechanical structure such as a thin finite copper plate, to "illuminate" the structure. We suppose that when damage is produced, the illumination propriety changes according to the position and the nature of damage. It is due to the reflection of acoustic waves occurring at the damage point. Therefore we consider damage as a diffraction source. With this consideration, we have developed a novel method for the detection of damage position. This method is based on the pattern recognition of reference diffraction signals.

To test the feasibility of developed method, an experimental set-up is designed, and an absorbent object made with silicone hammer is used to provide a source of acoustic diffraction signal. Two transducers are used for transmitting the Lamb waves, and one transducer is used as wave receiver which can measure the change of illumination propriety of discussed structure. The main advantage of presented method is to generalize the different damage types by diffraction source. The experimental results show that our process can measure not only the position of the calibrated silicone hammer but also other different damage.

Ключевые слова:

Содержание.

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