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Comparison of Distributed and Concentrated Networks of Piezoelectric Transducers

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In this paper results of comparison of distributed and concentrated piezoelectric networks are presented. They were used for elastic wave generation and acquisition. Elastic wave propagation phenomenon was used for damage localisation in thin aluminium panel. This approach utilises fact that any discontinuities existing in structural elements cause local changes of physical material properties which affect elastic wave propagation. Two methods of damage detection can be found in the literature: pitch-catch and pulse-echo. In this paper the latter was used. Elastic wave can be excited and received using piezoelectric transducer networks with different element arrangement. Transducer network configuration and the number of used piezoelectric elements have influence on the accuracy of damage localisation algorithm. Obviously the more elements there is the more data has to be processed. Acquired signals were corrupted with noise, therefore they had to be filtered before extraction of features. For this purpose algorithm for band pass filtering was developed. After filtering process further signal processing was conducted in order to create damage influence map. This map presents elastic wave energy connected with reflection from discontinuities. In order to create such a map the panel was covered with a mesh of points. In each point energy of elastic wave reflection was calculated and assigned to this point. This energy was extracted from all acquired signals and summed.

Ключевые слова:

Содержание.

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