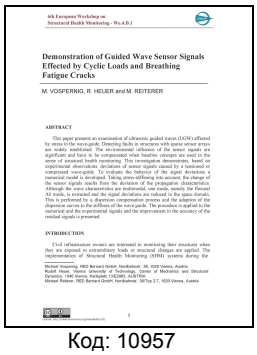

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Demonstration of Guided Wave Sensor Signals Effected by Cyclic Loads and Breathing Fatigue Cracks

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This paper presents an examination of ultrasonic guided waves (UGW) affected by stress in the wave-guide. Detecting faults in structures with sparse sensor arrays are widely established. The environmental influence of the sensor signals are significant and have to be compensated when baseline concepts are used in the sense of structural health monitoring. This investigation demonstrates, based on experimental observations, deviations of sensor signals caused by a tensioned or compressed wave-guide. To evaluate the behavior of the signal deviations a numerical model is developed. Taking stress-stiffening into account, the change of the sensor signals results from the deviation of the propagation characteristics. Although the wave characteristics are multimodal, one mode, namely the flexural A0 mode, is extracted and the signal deviations are reduced in the space domain. This is performed by a dispersion compensation process and the adaption of the dispersion curves to the stiffness of the wave guide. The procedure is applied to the numerical and the experimental signals and the improvement in the accuracy of the residual signals is presented.

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Ключевые слова:

Содержание