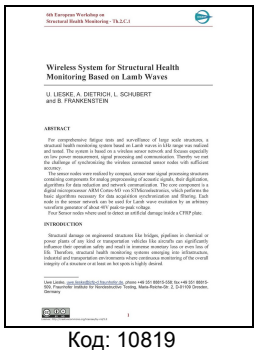

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Wireless System for Structural Health Monitoring Based on Lamb Waves

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For comprehensive fatigue tests and surveillance of large scale structures, a structural health monitoring system based on Lamb waves in kHz range was realized and tested. The system is based on a wireless sensor network and focuses especially on low power measurement, signal processing and communication. Thereby we met the challenge of synchronizing the wireless connected sensor nodes with sufficient accuracy.

The sensor nodes were realized by compact, sensor near signal processing structures containing components for analog preprocessing of acoustic signals, their digitization, algorithms for data reduction and network communication. The core component is a digital microprocessor ARM Cortex-M3 von STMicroelectronics, which performs the basic algorithms necessary for data acquisition synchronization and filtering. Each node in the sensor network can be used for Lamb wave excitation by an arbitrary waveform generator of about 40V peak-to-peak voltage.

Four Sensor nodes where used to detect an artificial damage inside a CFRP plate.

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Ключевые слова:

Содержание