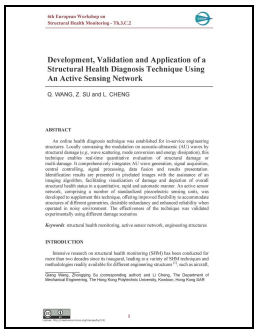

Код: 10835

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Development, Validation and Application of a Structural Health Diagnosis Technique Using An Active Sensing Network

Дрезден, Германия, 2012 год

8 стр; формат: 23,5 x 16 см; библиографический список: 10 единиц

An online health diagnosis technique was established for in-service engineering structures. Locally canvassing the modulation on acoustic-ultrasonic (AU) waves by structural damage (e.g., wave scattering, mode conversion and energy dissipation), this technique enables real-time quantitative evaluation of structural damage or multi-damage. It comprehensively integrates AU wave generation, signal acquisition, central controlling, signal processing, data fusion and results presentation. Identification results are presented in pixelated images with the assistance of an imaging algorithm, facilitating visualization of damage and depiction of overall structural health status in a quantitative, rapid and automatic manner. An active sensor network, comprising a number of standardized piezoelectric sensing units, was developed to supplement this technique, offering improved flexibility to accommodate structures of different geometries, desirable redundancy and enhanced reliability when operated in noisy environment. The effectiveness of the technique was validated experimentally using different damage scenarios.

Доклад. 6-я Европейская конференция по мониторингу технического состояния сооружений, 2012. Редакция Кристиана Боллера.

Ключевые слова:

Содержание