STATISTICAL METHODS FOR AUTOMATIC CRACK DETECTION BASED ON VIBROTHERMOGRAPHY SEQUENCE-OF-IMAGES DATA

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ABSTRACT

Vibrothermography is a relatively new nondestructive evaluation technique for finding cracks through frictional heat generated from crack surface vibrations under external excitations. The vibrothermography inspection method provides a sequence of infrared images as output. We use a matched filter technique to increase the signal-to-noise ratio of the sequence-of-images data. An automatic crack detection criterion based on the features extracted from the matched filter output greatly increases the sensitivity of the vibrothermography inspection method. In this paper, we develop a three dimensional matched filter for the sequence-of-images data, present the statistical analysis for the matched filter output, and evaluate the probability of detection. Our results show the crack detection criterion based on the matched filter output provides improved detection capability.