

Steel plate damage diagnosis using probabilistic neural network

Abstract

This paper discusses the application of frame energy based DFT spectral band features for the detection of damages in steel plates. A simple experimental model is devised to suspend the steel plates in a free-free condition. Experimental modal analysis methods are analyzed and protocols are formed to capture vibration signals from the steel plate using accelerometers when subjected to external impulse. Algorithms based on frame energy based DFT spectral band feature extraction are developed and prominent features are extracted. A Probabilistic Neural Network is modeled to classify the condition of the steel plate. The output of the network model is validated using Fallman testing criterion and the results are compared.

Keywords — DFT spectral band, discrete cosine transformation, experimental modal analysis, Fallman criterion, frame energy, probabilistic neural network, structural health monitoring