

Wireless Power Transfer based Eddy Current Technique for Comprehensive Non-destructive Evaluation

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: Eddy current testing (ECT) has widely used for non-destructive evaluation of metallic and composites' defects and failures. Due the fact that the diffusive nature of eddy current hampers the detection of deep defects due to the exponential decrease of the eddy current density within the (SUT's thickness and the associated dispersion phenomenon of sample under test (SUT), the signal-to-noise ratio (SNR) of ECT signals corresponding to deeper defects are usually very low. Recently, different excitation modes e.g. pulse compression which help increase the signal SNR for feature extraction and quantitative study were developed for eddy current testing. This paper reviewed the state-of-art of different excitation modes for eddy current testing including single frequency, multi-frequency, single pulse, pulse compression, sweep frequency and compared each type of the excitation mode based on its strength and weakness as well as the challenges. In addition, to overcome the issue of lacking information for multiple feature extraction happened in conventional eddy current testing due to single resonating response. A new approach of wireless power transfer is proposed and investigated on benchmark sample to evaluate its detectability of multiple parameters and ability of estimation of lift-offs. The principle and experimental studies of the proposed approach are reported and validated through comparison of different eddy current tests and evaluation.