

高电压技术

脉冲涡流检测的谱分析方法与缺陷分类识别

高军哲, 潘孟春, 罗飞路, 何赞泽, 陈棣湘

国防科学技术大学机电工程与自动化学院

摘要:

脉冲涡流检测技术采用周期矩形波作为传感器的激励信号, 其检测信号可以在时域进行分析, 也可以在频域进行分析。在频域分析中, 目前的研究主要对其幅频谱进行特征提取分析。将矩形波激励信号看作一种多频不等幅正弦合成信号, 分别对脉冲涡流检测信号的幅频特性和相频特性进行分析。结合脉冲涡流检测信号的频谱特点, 在幅频谱中, 提出谱相对变化用于不同类型缺陷的分类; 在相频谱中, 提出相位过零点对不同类型缺陷进行分类。通过脉冲涡流检测试验, 验证了所采用方法的正确性。

关键词: 脉冲涡流检测 谱分析方法 谱相对变化 相位过零点 缺陷分类

Spectrum Analysis and Defect Classification of Pulsed Eddy Current Testing

GAO Junzhe, PAN Mengchun, LUO Feilu, HE Yunze, CHEN Dixiang

College of Mechatronics and Automation, National University of Defense Technology

Abstract:

Pulsed eddy current (PEC) testing technique adopts a periodic rectangle wave as the excitation signal of eddy current sensors, thus testing signals can be analyzed both in time domain and in frequency domain. The current research work focused on amplitude-frequency characteristic in frequency domain. The periodic rectangle wave could be considered as a signal composed of multi-frequency unequal amplitude sine signals, and this paper studied the amplitude-frequency characteristic and the phase-frequency characteristic of PEC testing signals. According to the spectrum characteristic of signals in pulsed eddy testing, spectrum relative variation in amplitude-frequency spectrum and phase cross zero point in phase-frequency spectrum were respectively proposed to classify different types of defects. Pulsed eddy testing experiments verify the correctness of the proposed method.

Keywords: pulsed eddy current testing spectrum analysis method spectrum relative variation phase cross zero point defect classification

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通讯作者: 高军哲

作者简介:

作者Email: hngjz@126.com

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