Liftoff Correction Based on the Spatial Spectral Behavior of Eddy-Current Images

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Abstract:
In this paper, a new processing scheme for compensating the liftoff effect is proposed to increase the signal-to-noise ratio of measurements carried out when a duralumin plate with artificially manufactured defects was scanned with eddy-current probes. The mathematical algorithm is based on the spatial frequency behavior of the output signals with the liftoff distance (the distance between the probe used for inspection and the sample) and its equivalent form (deconvolution) in the spatial domain. Results are presented for measurements performed at three different distances for the same defect of the duralumin plate.

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Contents

I. Introduction

One method for determining the volume distribution of material conductivity consists of inducing eddy currents inside the conductor under test and measuring the magnetic field produced by those currents. This method has different technological applications. Nondestructive testing [1], [2], thickness measurement [3], surface treatment inspection of conductive materials, material property characterization [4], and biomedical induction tomography [5] can be mentioned. Single-frequency, multiple-frequency, and pulsed eddy-current measurement systems [6]–[8] are reported as robust and accurate solutions with wide application in nondestructive inspection of metallic structures of aircrafts.