

Pulsed eddy current signal analysis of ferrous and non-ferrous metals under thermal and corrosion solicitations

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Abstract: Most metals endure in contact with ambient air, liquids or other metals the phenomena of oxidation. The kinetics of the corrosion can be significant and destroy the metal. The marine corrosion or soil affects many materials, more than ever if it touches the pipeline, ship hulls or buried pipes. The investigation of NDT methods to predict corrosion behavior can be a rational solution to prevent from this kind of industrial problems. Eddy current and pulsed eddy current (PEC) are proposed as a powerful Nondestructive Testing and Evaluation (NDT&E) technique. The application of this kind of technique in the industrial domain is used in detection of the defects, particularly in the determination of corrosion information contained in the received signal gives the possibility to use the PEC in the Non Destructive Evaluation of materials that can be analysed. The work in this paper explains the behaviour of the eddy current, pulsed Eddy Currents and various electromagnetic parameters in the analysed samples. We have shown in this work that all microstructure modifications of the samples were detected and can be quantified by Pulsed eddy current measurements. Modifications of the microstructure obtained by air cooled, quenched and corroded samples in aluminium, heat treatment change in mild steel were evaluated by PEC.

Keywords : pulsed eddy current (PEC), lift off variation, corrosion