

PEC applications for detection of localized defaults – numerical and experimental approach

Fannie MEYER¹, Eilin Guillot¹, Gilles Girard¹

¹ERMES, EDF R&D, France

Pulsed Eddy Current techniques (PEC) are part of NDT used for many years in several industrial sectors. They are well adapted to the detection of generalized corrosion or to the evaluation of the thickness of the inspected part. Moreover, they can be used with coating and with a lift-off of the sensor from the contact surface. However, it's more complex to detect localized defaults such as cracks or crevice corrosion shape type flaws, in thick and ferro-magnetic materials such as pipes and tanks. EDF R&D has developed and tested a method using PEC allowing us to detect different localized defaults in the thickness. This method is based on the study of temporal signals variations after the end of the pulse. Moreover, it is possible to discriminate surface or sub-surface defaults. Several types of flaws have been tested, on several type of materials: in order of increasing difficulty, we present results on thin, non-magnetic material, then on thick material, such as pipes and plates, with surface and internal flaws. In order to optimize the sensor, we used a numerical tool with finite elements methods, allowing us to model the whole sensor plate and default by using parametric studies. Results from experiments and modeling are presented in the article, along with discussions. Further investigations are also presented.