

Lift-off Point of Intersection for Eliminating Lift-off Noise in Alternating Current Field Measurement

Jianchao Zhao¹, Wei Li¹, Xin'an Yuan¹

¹Center for Offshore Engineering and Safety Technology, China University of Petroleum(East China),
China

Lift-off is a challenging issue in alternating current field measurement (ACFM) technique. The spurious signals caused by lift-off variations are similar to the response signals of defects, resulting in defect misjudgment. In this paper, a lift-off point of intersection (LOI) feature is discovered for the first time from the raw signals of ACFM for the elimination of spurious signals caused by lift-off variations. A theoretical model is established to analyze the effect of lift-off variations on characteristic signals of ACFM. A 3D finite element model is built to analyze the effects of excitation frequency, conductivity and permeability on LOI. The ACFM probe and testing system are established, and the validation experiments are carried out. The results show that the traditional Bx signal is susceptible to the variation of lift-off, and the higher the excitation frequency, the closer the LOI is to a point. The novel Bx signal plotted by LOI amplitude has no spurious signals caused by lift-off variations and can also accurately evaluate the crack depth as with traditional Bx signals. Conductivity has a small effect on LOI and magnetic permeability has a large effect on LOI. The LOI feature proposed in this paper is only applicable to non-ferromagnetic materials.