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Modeling and Simulation for 3D Eddy Current Testing in Conducting Materials

S. Bennoud, M. Zergoug

Abstract: The numerical simulation of electromagnetic interactions is still a challenging problem, especially in problems that result in fully three dimensional mathematical models. The goal of this work is to use mathematical modeling to characterize the reliability and capacity of eddy current technique to detect and characterize defects embedded in aeronautical in-service pieces. The finite element method is used for describing the eddy current technique in a mathematical model by the prediction of the eddy current interaction with defects. However, this model is an approximation of the full Maxwell equations. In this study, the analysis of the problem is based on a three dimensional finite element model that computes directly the electromagnetic field distortions due to defects.

Keywords : Eddy Current, Finite Element Method, Non destructive testing, numerical simulations