Numerical simulation for cracks detection using the finite elements method

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Abstract: The means of detection must ensure controls either during initial construction, or at the time of exploitation of all parts. The Non destructive testing (NDT) gathers the most widespread methods for detecting defects of a part or review the integrity of a structure. In the areas of advanced industry (aeronautics, aerospace, nuclear …), assessing the damage of materials is a key point to control durability and reliability of parts and materials in service. In this context, it is necessary to quantify the damage and identify thedifferent mechanisms responsible for the progress of this damage. It is therefore essential to characterize materials and identify the most sensitive indicators attached to damage to prevent their destruction and use them optimally.In this work, simulation by finite elements method is realized with aim to calculate the electromagnetic energy of interaction: probe and piece (with/without defect).From calculated energy; we deduce the real and imaginary components of the impedance which enables to determine the characteristic parameters of a crack in various metallic parts.

Keywords : Eddy Current, Non-destructive testing (NDT), Cracks, Finite Element Method