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Study and modelling of a microwave sensor tocharacterize a dielectric materials and for CNDapplications

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Abstract : Non-destructive testing is a science of evaluationvarious properties of materials, without compromising itsusefulness and use. These properties can be physical, chemical,mechanical or geometrical. There are several techniques of nondestructive testing such as: acoustic emission, penetrate testing,eddy current, ultrasound and radiography, ... However, each ofthese methods has certain limitations and disadvantages. Sincethe 1970s, some researchers have tried to use microwavetechniques to detect possible surface cracks in metal components,volumic cracks in dielectric materials or to characterize adielectric material.The objective of this article is to present a method ofcharacterization of dielectric materials, by modeling a microwavesensor. A change in the resonant frequency of the microwavesensor resulting from a change in its effective dielectric constantis considered as an index to define the dielectric constant of thesample. This work was devoted to study, modelling andrealization of a micro strip structure by the method of moments,later this structure will be simulated by a numerical modellingsoftware HFSS (High-Frequency Structure Simulator) to confirmthe results and validate the model.

Keywords : Non-Destructive testing, Microwave Techniques, HFSS, Microwave Sensor, Dielectric Constant, Micro strip Modelling, moment method