

2018

Study and modelling of a microwave sensor to characterize a dielectric materials and for CND applications

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Abstract : Non-destructive testing is a science of evaluation various properties of materials, without compromising its usefulness 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 of these methods has certain limitations and disadvantages. Since the 1970s, some researchers have tried to use microwave techniques to detect possible surface cracks in metal components, volumic cracks in dielectric materials or to characterize a dielectric material. The objective of this article is to present a method of characterization of dielectric materials, by modeling a microwave sensor. A change in the resonant frequency of the microwave sensor resulting from a change in its effective dielectric constant is considered as an index to define the dielectric constant of the sample. This work was devoted to study, modelling and realization of a micro strip structure by the method of moments, later this structure will be simulated by a numerical modelling software HFSS (High-Frequency Structure Simulator) to confirm the results and validate the model.

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