

**DIELECTRIC SHEET PERTURBATION TO METALLIC AIR  
FILLED CAVITY – TECHNIQUES OF MICROWAVE  
NONDESTRUCTIVE TESTING (MNDT)**

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## ABSTRACT

For undergraduate project, split-cylinder resonator method is used which improved for non-destructive and accurate measurement for low permittivity materials at multiple frequency points. This project focuses on the dielectric sheet perturbation to the dominant TE<sub>111</sub> mode resonant frequency of a circular cavity. The dielectric sheet of flat substrate materials is placed at the middle of the air-filled cavity, introduced discontinuities and disturbs the configuration of electromagnetic fields in the cavity. For fixed dimensions of cavity and different thickness of the loading dielectric, it shows that the dominant resonant frequency varies with the permittivity of the dielectric. This relationship is verified using vector network analyzer and calculated with MAPLE software. Eleven samples with different thickness each have been measured and the result shows that each sample have its own values of permittivity at a certain frequencies. The result demonstrates that this project leads than to the possibility of using the middle loaded cavity at TE<sub>111</sub> mode as microwave non-destructive testing of materials.

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