

DETERMINATION OF REFLECTION AND TRANSMISSION COEFFICIENT OF PTFE AT X-BAND FREQUENCY USING NRW AND FEM METHODS

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ABSTRACT

This paper presents a comparison of measurement results of polytetrafluoroethylene (PTFE) is loaded waveguide between Nicolson-Ross-Weir (NRW) method and FiniteElement Method (FEM). The permittivity of PTFE values obtain from optimization technique and errors analysis have been conducted for scattering parameters incalculation and simulation results, variation mean relative errors with thickness of sample have been found and plotted.

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REFERENCES

- [1]. James Baker-Jarvis, "Dielectric and magnetic measurement methods in transmission lines: an overview," Proceedings of the 1992 AMTA Workshop, July 25, 1992, Chicago, Illinios.
- [2]. Leo P. Ligthart (1983). "A fast computational technique for accurate permittivity determination using transmission line methods", IEEE Trans. on Microwave Theory and Techniques, Vol. MTT-31, No. 3, pp. 249-254.
- [3]. A. M. Nicolson and G. F. Ross (1970). "Measurement of the Intrinsic Properties of Materials by Time-Domain Techniques", IEEE Trans, Instrum. Meas., Vol. 19, pp. 377-383.
- [4]. W. B. Weir (1974). "Automatic Measurements of Complex Dielectric Constant and Permeability at Microwave Frequencies", Proc. IEEE, Vol. 62, pp. 33-39.
- [5]. J. Baker-Jarvis, M. D. Janezic, J. H. Grosvenor, Jr., and R. G. Geyer (1993). "Transmission/reflection and Short-circuit Line Methods for Measuring Permittivity and Permeability", Natl. Inst. Stand. Technol., technical Note 1355-R.
- [6]. The Comsol Multiphysics (2006). "Quick start and Quick Reference", version 3.3 Comsol AB.
- [7]. C. J. Reddy, et al (1994). "Finite element method for eigenvalue problems in electromagnetic", NASA Technical Paper 3485.
- [8]. C. J. Reddy, et al (1995). "Application of FEM to estimate complex permittivity of dielectric material at microwave frequency using waveguide measurements", NASA Contractor Report.
- [9]. Z. Abbas, R.D.Pollard and R. W. Kelsall (2001). "Complex Permittivity Measurement at Ka-band Using Rectangular Dielectric Waveguide Technique", IEEE Trans. Instrum. Meas., Vol. 50, pp. 1334-1342.