

## Broad-band microwave characterization of a tri-layer structure using a coaxial discontinuity with applications for magnetic liquids and films

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N.-E. Belhadj-Tahar, O. Dubrunfaut and A. Fourier-Lamer. "Broad-band microwave characterization of a tri-layer structure using a coaxial discontinuity with applications for magnetic liquids and films." 1998 Transactions on Microwave Theory and Techniques 46.12 (Dec. 1998, Part I [T-MTT]): 2109-2116.

An analytic technique is described, which allows us to determine simultaneously complex permittivity  $\epsilon$  and permeability  $\mu$  of magnetic films or magnetic liquids. The cell is a gap in a coaxial line filled with three layers (for liquid samples, the two external layers are used as windows, and for films, the middle layer constitutes the substrate). Permittivity and permeability of the unknown layer(s) are computed from the S-parameters ( $S_{11}$ ,  $S_{21}$ ), which are measured in the gap, taking into account higher order modes excited at the discontinuity,  $\epsilon$  and  $\mu$  measured for ethanol and a ferrofluid (with an applied magnetic static field) are presented up to 18 GHz.

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