

**MICROWAVE NON-DESTRUCTIVE TESTING (MNDT)
OF MALAYSIAN WOODS AT X-BAND AND K-BAND**

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ABSTRACT

This work highlights the use of Free Space Microwave Measurement (FSMM) system using Microwave Non-Destructive Testing (MNDT) measurement system to determine the electrical properties of Malaysian woods at X-band and K-band. The electrical properties of interest are dielectric constant, loss factor and loss tangent. Malaysian woods used as samples are Medang, Puhah, Kempas, Petai and Yellow Meranti. The FSMM system consists of WILTRON 37269 Vector Network Analyzer (VNA), a pair of spot focusing antennae (transmitting and receiving) that operate in X-band and K-band, mode transitions, coaxial cables, sample holder, computer and a high performance workstation. The Thru, Reflect, Line (TRL) calibration technique were used to eliminate the effect of undesirable multiple reflection. The sample under test was placed in the middle of the two spot focusing antennae. The values of scattering parameters, S_{11} and S_{21} were measured. The electrical properties of the wood were then extracted from these measured parameters. The wood was placed according to its grain alignment and conducted from 0° to 180° rotation of the wood. It was observed that the dielectric constant (ϵ') is high when the wood grain is in parallel condition. In perpendicular condition of wood grain, the dielectric constant (ϵ') is low. The density of wood also has effect to electrical properties of wood. Kempas wood which has the highest value of density also has the highest value of dielectric constant. Petai wood which has the lowest value of density also has the lowest value of dielectric constant. Each wood sample has unique electrical properties.

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