

Effect of moisture content and grain direction on the dielectric properties of rubber wood at low frequencies

ABSTRACT

Dielectric constant and dielectric loss factor of rubber wood have been studied at different moisture content, grain direction and frequency. Different dielectric dispersion mechanisms are also observed at different ranges of moisture content. The moisture content above the fiber saturation point does not contribute much to the dielectric properties following a single dielectric mechanism. But the moisture content below the fiber saturation point shows considerable effect on the variations of dielectric properties having different dispersion processes at different moisture content ranges. Based on the shape of the curves, five different moisture content ranges have been identified such as 1) 25% and above, 2) 18-25%, 3) 11-17%, 4) 5-10% and 5) below 5%. It may be possible to explain all these dispersion processes by means of dielectric mechanism for dipole, quasi-dc and diffusive processes. Longitudinal direction shows a higher dielectric constant when compared to radial and tangential directions in oven-dry condition. This dielectric anisotropy may be attributed to the microscopic, macroscopic and molecular structures of wood.

Keyword: Anisotropy; Bound water; Dielectric constant; Dielectric loss factor; Dipole; Free water; Moisture content; Quasi dc; Rubber wood