

## **Dual frequency microstrip antenna sensor for water content measurements independent of temperature variation**

### **Abstract**

Temperature variation causes errors in all indirect moisture measurement methods. To increase the accuracy of moisture content determination and to reduce the influence of temperature, a two-parameter measurement is used. The method uses the magnitude of reflected waves at two microwave frequencies in the X-band region. A dual frequency sensor system is developed to measure moisture content of dielectric-lossy liquids. The experiment is based on measurements of far-field reflection magnitudes at two different frequencies 8.48 GHz and 10.69 GHz using circular microstrip antennas. A calibration equation is sought that instantly gives temperature-independent moisture content of the samples under consideration. The sensor is integrated with a data acquisition card to record the detected reflection signals. The data analysis and error-correction technique are implemented using custom designed software. The system is tested using diluted rubber latex with moisture content ranging from 39.8% to 91.2% wet basis. The moisture content was predicted with a standard error less than 1.3% for the temperature range of 25 °C to 63 °C compared to the standard oven-drying technique

**Keyword:** microwaves, water content, rubber latex, temperature independent