


Original Paper

A Microwave Transmission Instrument for Rapid Dry Rubber Content Determination in Natural Rubber Latex

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Abstract

We report the design, implementation and testing of an instrument for rapid dry rubber content (DRC) determination in rubber latex. It is composed of rectangular waveguide antennae, microwave generator, power detector, and microcontroller. According to the theory of microwave transmission, the power loss of microwaves passing through latex is related to the DRC. This attenuation is determined by measuring the transmitted microwave intensity with a power detector. The appropriate frequency that gives the best correlation between DRC and attenuation was found to be about 2.36 GHz. The microwave power measurement is processed by the microcontroller using the empirical calibration equation to estimate DRC in rubber latex. The instrument was tested using new latex samples with various DRC, sampled locally in Songkhla province, Thailand, and the DRC estimates by the instrument were compared to the slow but accurate standard oven-drying results. The estimates had an 0.21 % mean error and $R^2 = 0.9983$, indicating good practical performance.

Keywords

Dry rubber content; Latex; Microwave; Attenuation