FREE-SPACE MEASUREMENT OF REFLECTION AND TRANSMISSION LOSS AT MICROWAVE FREQUENCIES

Thesis is presented in partial fulfilment for the award of the Bachelor of Electrical Engineering (Hons) of
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ABSTRACT

The main objective of this project is to develop a free-space measurement system at microwave frequencies in the frequency range of 8.2 to 12.4 GHz (X-band) for measurement of reflection coefficient, Sn and transmission coefficient, S21 of planar materials (i.e fused quartz, teflon, PVC, nylon and etc) and composite materials of a given dielectric constant and the thickness of each materials. The measured value of reflection loss and transmission loss is calculated in order to get the value of S 1 1 and S 2 1 and thus can be used to get the value of power absorption coefficients (PAC).

Using transmission and return loss (reflection) measurements, we have developed a method for microwave nondestructive testing of several composite materials. The key components of the measurement system consist of transmit and receive spot-focussing horn lens antenna, and the vector network analyzer. Beacuse of the far-field focussing ability of horn lens antennas, free-space measurement can be made at microwave frequencies in a relatively compact and simple measurement setup.

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