UNIVERSITI TEKNOLOGI MARA

BANDWIDTH ENHANCEMENT AND SIZE REDUCTION OF 4.75 GHz METAMATERIAL MICROSTRIP PATCH ANTENNA FOR RADAR APPLICATION

NURUL FADZLIN BINTI GHAZALI

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ABSTRACT

This paper presents a rectangular microstrip patch antenna with Defected Ground Structure (DGS) for radar systems application. Metamaterial approach has been introduced in designing the antenna to improve the performances. Its characteristics were identified by gaining negative value for permeability, u and permittivity, *s* simultaneously after performing DGS structures. It can be verified by using Nicolson-Ross-Weir (NRW) method. The antennas were designed to resonate at 4.75 GHz. The design and simulation have been carried out by Computer Simulation Technology (CST) Microwave Studio software version 2011. The realization of the antennas were made on Rogers RO3003 substrate with relative permittivity, s_r=3.00 and thickness, h=0.75mm. The measurement has been done by using Vector Network Analyzer (VNA). The simulation results indicate that the size and return loss, Sn of the metamaterial antenna have been reduced up to 41.99%*and 64.27% respectively. At the meantime, the bandwidth of the metamaterial antenna has been enlarged up to 231.34%) which is more than 3 times better as compared to conventional antenna. The simulation and measurement results are also found to be in a good agreement.

Keywords: microwave, microstrip patch antenna, Defected Ground Structure, metamaterial.

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