

Efficiency Improvement for Conventional Rectangular Horn Antenna by Using EBG Technique

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Abstract : The conventional rectangular horn has been used for microwave antenna a long time. Its gain can be increased by enlarging the construction of horn to flare exponentially. This paper presents a study of the shaped woodpile Electromagnetic Band Gap (EBG) to improve its gain for conventional horn without construction enlargement. The gain enhancement synthesis method for shaped woodpile EBG that has to transfer the electromagnetic fields from aperture of a horn antenna through woodpile EBG is presented by using the variety of shaped woodpile EBGs such as planar, triangular, quadratic, circular, gaussian, cosine, and squared cosine structures. The proposed technique has the advantages of low profile, low cost for fabrication and light weight. The antenna characteristics such as reflection coefficient (S11), radiation patterns and gain are simulated by utilized A Computer Simulation Technology (CST) software. With the proposed concept, an antenna prototype was fabricated and experimented. The S11 and radiation patterns obtained from measurements show a good impedance matching and a gain enhancement of the proposed antenna. The gain at dominant frequency of 10 GHz is 25.6 dB, application for X- and Ku-Band Radar, that higher than the gain of the basic rectangular horn antenna around 8 dB with adding only one appropriated EBG structures.

Keywords : conventional rectangular horn antenna, electromagnetic band gap, gain enhancement, X- and Ku-band radar

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