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EBG-Inspired Reconfigurable Patch Antenna for Frequency Diversity Application

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Abstract— In this paper, a periodic structure of electromagnetic band gap (EBG) unit-cell is discussed which can be used in designing a reconfigurable planar microwave antenna. The analysis of 3 × 3 structure of the EBG unit-cell is proposed. A reconfigurable antenna was realized by directly exciting the EBG structure with an impedance transformer. It is also made possible by providing ON-OFF switch to each of the unit-cell using PIN diodes. The two different bias configurations of the unit-cells based on the solution of the genetic algorithm are discussed and verified in the frequency range between 1-6 GHz. The tested diversity frequencies at 2.215 GHz, 2.6 GHz and 3.02 GHz are in agreement with the simulated dispersion profile of the EBG structure. A miniaturization up to 66 % was achieved based on the solution of the genetic algorithm. The antenna will be useful to meet not only the demand of frequency diversity but also to support communication and sensing applications simultaneously.

Keywords: electromagnetic band gap, frequency diversity, genetic algorithm, miniaturization