

Microstrip antenna's gain enhancement using left-handed metamaterial structure

Abstract

The design, simulation and fabrication of a left-handed metamaterial (LHM) structure is presented. The combination of the modified square rectangular Split Ring Resonator (SRR) and the Capacitance Loaded Strip (CLS) were used to obtain the negative value of permeability, μ and the negative permittivity, ϵ . Nicolson-Ross-Wier approach was used to identify the double negative region. A good agreement between simulated and measured results has been achieved. Upon incorporation with a single patch microstrip antenna, the performance of the antenna was improved where the gain of the microstrip antenna was increased up to 4 dB, and its bandwidth widens from 2.9% to 4.98%. These improvements are due to the negative refraction characteristics of the LHM structure that acts as a lens when placed in front of the antenna.