ABSTRACT

Ultra-Wideband (UWB) is one of the most widely used technologies recently in science or industry. Regulation for UWB from Federal Communications Commission (FCC) amended in February 14, 2002. The FCC allocated a bandwidth of 7.5Ghz with frequency performance range from 3.1Ghz - 10.6Ghz. UWB has more effeciency, the bandwidth is obviously wider and has smaller antenna design, but the gain is smaller over the conventional communications system. There are many ways to increase gain of the antenna from changing the material of the antenna or adding reflector such as Metamaterial, Artificial Magnetic Conductor (AMC), Substrate Integrated Waveguide (SIW), and Frequency Selective Surface (FSS).

This thesis design of UWB antenna with gain enhancement using Multilayer FSS. Initially, an ultra-wideband planar monopole antenna with circular shape is added by a circular slot on the ground which provides a wide bandwidth from 3.1Ghz to 10.6GHz with VSWR ≤ 2. The dimensions LgxWgxh of the ultra-wideband planar monopole antenna is 45301.6 mm^3. Finally, multilayer frequency selective surface reflector is employed below the proposed UWB antenna to enhance the gain. The first and second layers FSS consist of 3x3 array of elements on 108x108x1.6 mm^3 substrate FR-4. The first layer located at a distance of 20 mm below the proposed antenna while the second layer located at a distance of 25 mm below the first layer FSS.

The observation is done by simulation on CST Microwave Studio and measurement of fabricated antenna. The peak gain of proposed antenna is increase from 5.08 dBi to 9.88 dBi with average gain 8 dBi. Measurement results of the fabricated prototype has some different result with simulation due to obstacles and human errors during the measurement.

Keywords: Ultra-Wideband, Multilayer FSS, Gain Enhancement