ABSTRACT

Technology advancements have made wireless communication a need in daily life, from little things like the use of remote controls to medical applications. The use of antennas in medicine can take many different forms, microwave imaging being one of them. A straightforward method for locating the dispersion of observed objects is microwave imaging. The detection of breast cancer is one of the uses of microwave imaging. Breast cancer is the highest number of cancer cases in Indonesia and is the first contributor to cancer deaths.

The microstrip antenna is the most popular antenna for wireless communication because it is simple to make and inexpensive. However, the microstrip antenna has various disadvantages, one of which is its limited bandwidth. Monopole planar antenna is one solution to the low bandwidth of microstrip antenna. Monopole planar antennas also have advantages such as close-to-omnidirectional radiation patterns and a simple structure that makes them easy to build at a low cost. Metamaterials can be added to the antenna to make it work at frequencies ranging from 3.1 to 10.6 GHz (ultra-wideband). In addition to increasing bandwidth, metamaterials also have advantages such as low production costs and can be used as a miniaturization method.

In this final project, a monopole planar antenna with a hexagonal patch is designed with adding metamaterials. The simulation findings reveal a working frequency of 3.0699 - 20.779 GHz, however, the actual values show 2.6 - 11.3 GHz and 15.2 - 17 GHz. The simulation yielded a bandwidth value of 17.7091 GHz, while the real results were 8.7 GHz and 1.8 GHz. The resulting return loss value is ≤10 dB, with a VSWR of ≤2. The resulting gain at a frequency of 7,038 during simulation is 1,963 dBi and 1,698 dBi during realization. Changes in electromagnetic parameters will also be noticed when the antenna identifies cancer.

Keywords: *Ultra-wideband, UWB, Monopole Planar, Hexagonal Patch, Metamaterial, Microwave Imaging.*