

ABSTRACT

Indonesia, as an archipelagic country, often experiences unstable weather phenomena that can affect various economic and social sectors. Therefore, an early warning system supported by weather radar technology is essential. This study aims to develop a microstrip antenna with a reflector-based feed to enhance the bandwidth and gain of antennas in weather radar systems. The research focuses on the design of an E-Shaped Microstrip Antenna (MSA) and the application of metamaterials to improve antenna performance in supporting more efficient weather radar operation at a frequency of 5.8 GHz using a Rogers RT5880 substrate.

The use of a parabolic reflector antenna with a microstrip antenna feed system based on metamaterials has been proven to enhance antenna performance, thereby supporting operation at weather radar frequencies. Microstrip antennas offer advantages such as simple structure, lightweight design, and fabrication flexibility. Performance calculations and simulations were conducted using CST Studio Suite and MATLAB, followed by analysis of the design results and testing.

The proposed antenna demonstrates superior characteristics, including a gain of 25.99 dBi, a bandwidth of 106.8 MHz, a return loss of -12.07 dB, and a VSWR of 1.04. With these features, the designed antenna serves as an effective technical solution to support the performance of weather radar systems in Indonesia.

Keyword: E-Shaped Microstrip Antenna, Metamaterials, Parabolic Antenna, Weather Radar.