

ABSTRACT

Radar is an electromagnetic wave system that is used to detect, measure distances and map objects such as ships, aircraft and motor vehicles. Radar coverage area can be determined from the bandwidth, transmit power, signal propagation, gain, beamwidth and antenna polarization. LIPI (Lembaga Ilmu Pengetahuan Indonesia) has built its own sea radar with antenna patch microstrip consists of 8 modules therefore it contains 64 element patches. The excitation of 8 modules in this antenna required power combiners to combine all of the modules, which will cause a mechanical trouble. Waveguide slot antenna could be a solution for this problem and this antenna can be designed in one module, therefore the power combiners are not required anymore.

Design of waveguide 16 slots antenna is proposed in this final project to operate at x-band frequency (9,4 GHz), it is a development of waveguide 8 slots antenna. This antenna is a sub-array which will developed to design a waveguide 64 slots antenna. At design of waveguide 8 slots antenna, which produced less narrow beamwidth and the result of gain is not big enough. In designing of waveguide 16 slots antenna, the position, dimension of slots and feeder will determine how the antenna radiates, therefore iteration will be used to reach the antenna parameters specification requirements.

A waveguide 16 slots antenna has been designed and fabricated, the measurement result shows that the antenna operates at x-band frequency (9,4 GHz) with $VSWR \leq 1,5$. This antenna has good performance with 60 MHz bandwidth, 19° of horizontal beamwidth and 12,93 dBi gain. The measurement result shows that antenna can produces a narrow beamwidth and gain is big enough for coastal surveillance radar applications.

Keywords : *waveguide slot antenna, coastal surveillance radar applications*