UNIVERSITI TEKNOLOGI MARA

RECTANGULAR SLOT ARRAY ON BIOMASS HOLLOW PYRAMIDAL MICROWAVE ABSORBER

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ABSTRACT

Microwave absorbers are necessary to eliminate unwanted radiation and it plays important roles in making sure that stray or unwanted radiations are properly absorbed. Currently, the commercial absorber faced the design problems in terms of heavy weight, non-modifiable and expensive material. Competitive researches have proposed advanced design of microwave absorbers in a variety of solutions in providing green and practical microwave absorbers. In this research, the main objective is to develop a novel design of rectangular slot array on biomass hollow pyramidal microwave absorber for the frequencies of range between 5GHz to 12GHz. The rectangular slot is implemented in order to improve its absorption performance compared to the original non-slotted. In the development, the 16 fabricated microwave absorbers are coated with coconut shell activated carbon and the different rectangular slots size and orientation designs are implemented on biomass hollow pyramidal microwave absorber. The slots size is determined using the operating frequency of the designs. The absorption is measured using the free space method of Naval Research Laboratory (NRL) arch in the frequency range of 5GHz to 12GHz covering C and X bands. In the initial study, the measurement shows that a single-slot pyramidal microwave absorber achieved maximum absorption increment from -0.37dB up to -13.54dB. Variation of slot size and orientation were carried out to analyse their response towards absorption performance. Further, the project also examined the use of multiple slots at different number, size and orientation. In the measurement results, the highest absorption performance of single slot at X band is -43.89dB, two slots parallel at C band is -57.97dB, four slots series at X band is -44.67dB, and multiple of vertical slots at C band is -63.67dB. Based on the proposed structures, the multiple slots of vertical, incline 45° and 135° and different size 9GHz, 6GHz, 3GHz order designs have produced the best absorption performance above -40dB at C and X bands. It is also shown that the single slot has improved the absorption performance compared to the non-slot design for all bands.

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