A NEW APPROACH OF BROADBAND ANTENNA USING METAMATERIAL

INSTITUT PENGURUSAN PENYELIDIKAN
UNIVERSITI TEKNOLOGI MARA
40450 SHAH ALAM, SELANGOR
MALAYSIA

BY:

AHMAD ASARI SULAIMAN
NOOR HASIMAH BABA
ROBI'ATUN ADAYIAH AWANG
MOHAMAD HUZAIMY JUSOH
ZUHANI ISMAIL KHAN
PROF. ZAIKI AWANG
PROF. MAZLINA ESA
MAZLAINI YAHYA
NUR EMILEEN ABD RASHID
AZIATI HUSNA AWANG
ADIB OTHMAN

MEI 2010

ABSTRACT

This research has proposed a new generation of antenna that applies metamaterial as a based substrate to enhance the performance of the device and reduce the size of the circuit area. The current bulky size of conventional antenna on single layer can be easily replaced by the invented metamaterial from this research.

An omega structure was chosen from two combination materials; Flame Retardant 4 and Perfect Electric Conductor were used to produce the material that has negative permittivity. An investigation into the S-parameters has been carried out to prove the negative permittivity produced by the metamaterial.

This research is focusing on the simulation of the metamaterial antenna in order to enhance the bandwidth of the device and come out with a compact antenna. Another investigation is to use the metamaterial as a cover or reflector to the conventional transceiver device. The results from the investigation show that the metamaterial able to improve the bandwidth and directivity of the conventional antenna.

Results from the investigation show that the return loss of the metamaterial antenna and the conventional antenna that applied the new material as cover provide better responses in term of bandwidth, amplitude of the loss and directivity compared to the conventional antenna. The obvious feature is the size reduction of the device which can be reduced more than 50% of the conventional design. The antennas lead to the enhancement of the technology, hence provide an a sophisticated technology to the consumers by the advantages such as smaller in size, cheaper in cost and better in performance.

PENGHARGAAN

Setinggi-tinggi penghargaan dan ribuan terima kasih diucapkan kepada semua pihak yang terlibat secara langsung dan tidak langsung bagi membolehkan penyelidikan ini disiapkan dengan sempurna.

Di antaranya :

Kementerian Sains, Teknologi dan Inovasi (MOSTI)

Institut Pengurusan Penyelidikan (RMI), UiTM

Prof. Dr. Titik Khawa Abdul Rahman
(Dekan Fakulti Kejuruteraan Elektrik)

Prof. Dr. Zaiki Awang
(Ketua Pusat Teknologi Microwave)

dan

Semua ahli penyelidik, rakan-rakan pensyarah yang telah memberikan kerjasama dan komitmen. Penyelidikan ini dapat dijayakan adalah hasil dari sokongan dan idea semua pihak.

TABLE OF CONTENTS