

OPTIMIZATION OF APERTURE SHAPE IN APERTURE-COUPLED MICROSTRIP ANTENNAS USING GENETIC ALGORITHM

Hadi Aliakbarian^{1,2}, Nasrin Hojjat^{1,2}, Jalil Rashed-Mohassel¹

¹Univ. of Tehran , ECE. Dept., Faculty of Eng., Center of Excellence on Applied Electromagnetic Systems, North Kargar st., Tehran, Iran

²Iran Telecommunication Research Centre (ITRC), North Kargar Ave, Tehran, Iran

One of the best promising structures for bandwidth requirements is microstrip aperture coupled antennas. It is declared that these kind of antennas can demonstrated impedance bandwidths ranging from 5This improvement in bandwidth is primarily a result of the additional degrees of freedom offered by the stub length and coupling aperture size and shape.

The shape of the coupling aperture has a significant impact on the strength of coupling between the feed line and patch. Thin rectangular coupling slots have been used in the majority of aperture coupled microstrip antennas, as these give better coupling than round apertures. Slots with enlarged ends, such as dogbone, bow-tie, or H-shaped apertures can further improve coupling. In this paper the problem of finding an optimized aperture shape using the genetic algorithm is regarded.

The first step of solving this problem is to analyze the antenna accurately. Analysis of the aperture coupled microstrip element is complicated by the presence of two dielectric layers, and the microstrip line-to-slot transition. Adding up the advantages and disadvantages if some of the analysis methods, we chose the moment method. The detailed formulation about the slected method will be presented in full paper.

One of the key points in solving optimization problems using these algorithms is to evaluate each solution of the problem and score it by the means of an appropriate function named cost function. The fitness function for evaluation of each chromosome is considered as a weighted sum of S11 parameter in different frequencies. In order to find the best shape, which can be used as an aperture, the problem of optimization of bandwidth in a simple rectangular patch antenna is considered and optimized. It is obvious that for other variations of microstrip antenna such as dual band structure the similar problem can be used. The regarded area for aperture is divided to many squares and the algorithm will determine that which of them should be metal or not.

As it will be discussed in the main paper, very suitable results are obtained and some important results about the shape of the aperture are concluded. Some considerations on constructability of the obtained results are presented.

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1. (a) Hadi Aliakbarian
Univ. of Tehran
ECE. Dept.
Faculty of Eng.
Center of Excellence on Applied
Tehran, Tehran
14395-515 Iran
h.aliakbarian@ece.ut.ac.ir
- (b) +98-913-2763999
- (c) +98-21-8633029
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3. (a)
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