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Seyed Vahid Mohammadi Bonehi

Computer Aided Microwave Filter Tuning through Circuit Parameter Extraction.

ABSTRACT - Masterthesis

In many filters applications we are allowed to tune the filter in order to achieve a better response that suit our specific application, to do that one is required to change arbitrarily the screws on filter provided for this purpose. This task can be cumbersome by just relying on our output from S-parameters. Since it is difficult to establish a relation between screws and the S-parameters response, therefore we have to arbitrarily alter the screws and check if the result is the one which we expect or not.

Therefore we need a more convenient tool for analysis and working with the result or in other words we need an approach to interpret S-parameters result in a meaningful way with respect to each resonator and corresponding screws an the filter.

Coupling Matrix of filter can fulfil the required criteria conveniently, since each element of the matrix is addressing a specific part of the filter for instance element M12 of such a matrix, second element in first row of matrix, point to coupling between first and second resonator of filter. Therefore one can easily achieve any desired response by altering coupling matrix elements and then applying the equivalent changes to screws for tuning the filter. The main advantage of this new approach apart from being faster due to usage of the computer, it can be considered as a more scientific approach.

To form coupling matrix, we need to know about consisting elements of our circuit. While as a user we may not know about consisting element of circuit, in other word we are dealing with a black box which has just an input and output. So basically this article is divided into two main sections, first to find out the consisting element of a circuit by means of our measurement i.e. output of S-Parameter, then applying our knowledge to form coupling matrix by knowing the consisting element.

This document illustrating how a coupling matrix can be built up form S-Parameter response of a band pass filter and how one can achieve response of circuit by means of that.