

ABSTRACT

This thesis introduces new design techniques for microwave filters and multiplexers in waveguide technology. These devices find wide application in communication systems, such as satellite links or wireless base stations.

In particular, the work has been focused in the design of circular-waveguide dual-mode (CWDM) filters. The synthesis technique makes use of distributed models, which are a halfway point between the fast but imprecise lumped circuit models, and the more accurate but costly full-wave electromagnetic models. An automatic software tool to design this type of filters has also been developed, which is able to obtain the physical dimensions of the filter in a matter of minutes.

A new technique to correct manufacturing deviations in CWDM filters is proposed next, which avoids the use of tuning screws. Instead, fixed squared insertions are employed, which can be fabricated in separated pieces. A space mapping technique is used to calculate the dimensions of these pieces and, after few iterations, the procedure is able to achieve the required response.

A systematic method to design manifold-coupled multiplexers is also presented, which also employs distributed models. First, the design of classic multiplexers with CWDM filters is considered. The whole design procedure is thoroughly explained, starting from the required specifications and finishing with the physical dimensions. Finally, the design of a non-conventional wideband multiplexer with a new type of rectangular-waveguide filters is addressed.