

Waveguide Filters Using Dielectric Resonators

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In collaboration with Professor Cristiano Tomassoni from the University of Perugia, RS Microwave has recently developed a new class of waveguide filters which make use of bypassed dielectric resonators. RS Microwave engineering staff has been focused over the past few years in finding new solutions and implementations overcoming (or at least alleviating) the state-of-art limitations of pseudoelliptic evanescent mode filters.

The basic structure of these filters (Figure 1) is the singlet, which includes a $TE_{01\delta}$ mode dielectric resonator embedded in a propagating waveguide. The propagating mode of the waveguide both excites and bypasses the dielectric resonator allowing the generation of a filter pole and a transmission zero. Higher order filters with multiple poles and transmission zeros can be obtained by simply cascading multiple basic singlet structures.

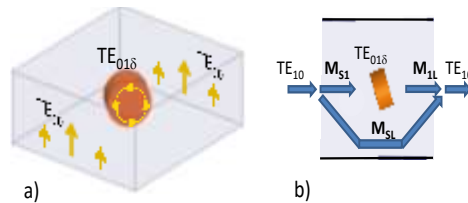


Fig. 1 Basic Singlet Structure

A prototype filter has been design and manufactured. Figure 2 shows the experimental results along with the prototype structure. As is evident by the filter performance, this new technique allows for the realization of compact waveguide pseudoelliptic filters having steep transition bands thanks to the transmission zeros. Moreover, each transmission zero is individually controlled by the corresponding singlet, thus easing the tuning process.

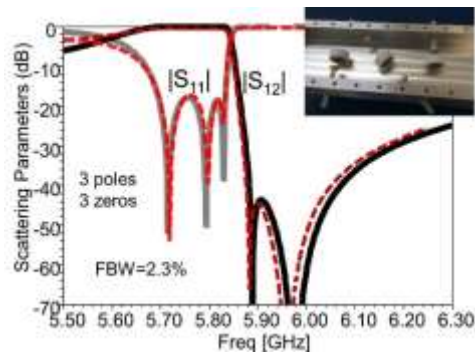


Fig. 2 Filter Prototype and Measurement

An extended version of this work, where singlets and waveguide cavities are used at the same time in order to obtain wide passband and extremely close transmission zeros, has been submitted to the Transaction on Microwave Theory and Techniques and it is currently under review.

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