Abstracts

Inverted-Resonator Evanescent Mode Filters

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Inversion of some or all of the resonators in an evanescent-mode bandpass structure allows for achieving wide bandwidth filters, with some transmission zeroes located at DC, some at infinity. Close spacing, as occurs when bandwidth is large, implies higher-order mode coupling and thus accurate design requires consideration of these modes. The resulting filters still display the small size, low loss and wide stopbands common to evanescent mode structures in general. Resonator inversion is equivalent to replacing the electric wall equivalent between conventional evanescent resonators with a magnetic wall, which allows for some degree of net capacitive coupling. Use of spectral domain and other field solving techniques combined with measurement of two-resonator sets, and extract ion of multimode equivalent circuits, enables look-up table design for both conventional and inverted resonator configurations thus facilitating the use of both within the same filter. In the method used in this paper, multimode equivalent circuits are extracted using the Weierstrassian E-function to minimize the difference between E-M calculated or lab measured S-parameters and assumed equivalent circuit S-parameters. This paper applies the method to filters with similar upper and lower stopband slopes, bandwidths of up to 80% and stopbands extending up to 20 times the filter center frequency. As has been shown in [10], the method can be applied to cases in which the resonators are a mixture of dielectric resonator, waveguide, etc.

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