Abstracts

An original approach to the design of bandpass cavity filters with multiple couplings

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A novel approach to the design of general cavity filters with each cavity coupled to an arbitrary number of other cavities is presented. This approach is based on a suitable characterization of the filter structure which does not require one to model separately the cavities (resonators) and the coupling elements. Suitably defined equivalent admittances are associated with each cavity allowing one to design the filter structure once the parameters of a suitable low-pass prototype are given; an efficient procedure for the synthesis of such a prototype with equiripple passband response is also presented which allows one to arbitrarily prescribe transmission zeros placed in the complex plane (even asymmetrically). The described design approach is particularly convenient when the filter structure does not allow a simple modeling of the resonators and coupling elements separately. This is the case of slot-coupled cavity filters and of filter structures based on arrays of coupled transmission lines. It is also shown that the simplified design approach often adopted in the past, where only two coupled cavities at a time are considered, can produce large errors even in the case of filters with all attenuation poles at infinity (i.e., two couplings per cavity).

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