Abstracts

A Low-Pass Prototype Network for Microwave Linear Phase Filters

A new approximation theory is presented for a low-pass prototype filter which simultaneously optimizes both the passband amplitude and phase response of the scattering transfer coefficient over the same finite band. This closed form solution is expressed in terms of single polynomial, which is readily generated through a simple recurrence formula, and has been termed the equidistant linear phase polynomial since its phase deviation from linearity vanishes at equidistant points along the real frequency axis. A synthesis procedure is presented for the realization of this transfer function using a resistively terminated, symmetrical, lossless, two-port network where extensive use is made of the immittance inverter concept. The even-mode admittance, which defines the network, possesses a simple closed form representation in terms of the equidistant linear phase polynomial and its derivative, and consequently, the entire theory is derived in an analytic form. Typical performance characteristics are graphically presented for networks of up to 14th degree, illustrating the superiority of this new approach over any other known form of approximation theory for selective linear phase filters.

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