Abstracts

Synthesis of Mixed Lumped and Distributed Impedance-Transforming Filters

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The design of a class of impedance-transforming filters in the form of very compact and convenient mixed lumped and distributed ladder networks is presented. The synthesis utilizes the distributed prototype technique introduced in a previous paper, but here a new approximation function appropriate to the impedance transformer problem is derived. In addition to combining the properties of an impedance transformer and a low-pass filter, the new circuit represents a solution to the problem of short-line matching to an extreme impedance value without using extreme impedance values in the transformer. Broad-band designs are tabulated for a wide range of parameters. A discussion of the application of the technique in the design of mixed lumped and distributed broad-band matching networks is included. A 50-10-Omega transformer was designed for the band 3.5-7.0 GHz, having a voltage standing-wave ratio of 1.15 and giving an attenuation >20 dB in the band 10.5-21.0 GHz. The length of this transformer is 0.875 in, and the experimental results showed excellent agreement with theory.

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