Abstracts

The Half-Wave Stepped Digital Elliptic Filter

J.D. Rhodes. "The Half-Wave Stepped Digital Elliptic Filter." 1969 Transactions on Microwave Theory and Techniques 17.12 (Dec. 1969 [T-MTT]): 1102-1107.

A design procedure for narrow-band bandpass TEM-line elliptic-function filters is presented. The proposed realization is in the form of a stepped-impedance digital n-wire line which is one-half of a wavelength long at midband and short circuited to ground at both ends, where the digital line is stepped in impedance along any arbitrary prescribed plane in the filter. Due to its physical form and mode of electrical operation, the filter has been termed the half-wave stepped digital elliptic filter. A detailed design procedure for the construction of the two characteristic admittance matrices which describe the digital n-wire line from the low-pass prototype element values is presented. It is also shown that the normalized impedance values of the elements in the filter are all of the order of unity and independent of the actual bandwidth of the falter except for the input and output transformer elements. A numerical example and experimental results on a seventh-degree 1-percent bandwidth filter with a center frequency at 3.7 GHz are given, demonstrating the significant improvements which may be obtained from the half-wave stepped digital elliptic filter over most other known form of microwave TEM-line narrow-band bandpass filter.

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