Network synthesis using Legendre and Hermite polynomials.

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Abstract

The range and variety of networks to be synthesized are extended by making use of the Legendre and modified Hermite polynomial functions. The Legendre polynomial transmission networks produce the least amount of ripple in the pass-band for a specific amount of skirt selectivity, and the least amount of group delay distortion as compared to that of the Tschebyscheff networks.

Synthesis techniques are used to obtain the low-pass prototypes of these networks on a normalized unitary basis as regards both frequency and impedance level scaling. The low-pass prototype networks are then resealed to the real frequency domain and impedance desired of the particular network.

The uniform dissipation predistortion technique is used to compensate for incidental dissipation present in the reactive elements used in the physical construction of the networks.

The transient response to a unit impulse or delta function is worked out for a Legendre low-pass prototype network. A Legendre low-pass filter is constructed. Experimental measurements made on this structure are compared with their theoretical characteristics.

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