Abstracts

General Synthesis of Quarter-Wave Impedance Transformers

H.J. Riblet. "General Synthesis of Quarter-Wave Impedance Transformers." 1957 Transactions on Microwave Theory and Techniques 5.1 (Jan. 1957 [T-MTT]): 36-43.

This paper presents the general synthesis of a radio frequency impedance transformer of n quarter-wave steps, given an "insertion loss function" of permissible form. This procedure parallels that of Darlington for lumped constant filters by providing the connection between Collin's canonical form for the insertion loss function and Richards' demonstration that a reactance function may always be realized as a cascade of equal length impedance transformers terminated in either a short or open circuit. In particular, it is shown that insertion loss functions of the form selected by Collin are always realizable with positive characteristic impedances, and that the synthesis procedure, for maximally flat and Tchebycheff performance, involves the solution, at most, of quadratic equations. In addition, this procedure permits the proof of Collin's conjecture that, for his insertion loss function, the resulting reflection coefficients are symmetrical. Finally, closed expressions are given for the coefficients of the input impedance of a given n section transformer in terms of the n characteristic impedances and vice versa.

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