Abstracts

Optimal Synthesis of Distributed Parameter Systems

A technique is developed for the synthesis and design of a distributed parameter system guiding waves from one point in space to another. The parameter distributions are assumed to be nonrestricted except for the upper and lower bounds resulting from the imposition of physical realizability. The problem is similar to the "sensitivity" problem encountered in the optimal control of the systems. An improved version of the first-order gradient technique is used to obtain the optimal distributions of the parameters. The first-order gradient technique is sensitive to the form of the arbitrary distributions assumed at the start of the iterations. This technique has serious convergence problems associated with it. The problem is particularly severe and is encountered in "singular" optimal control problems. The algorithm devised here improves the first-order gradient technique so that it becomes less sensitive to the initial assumed distributions and virtually eliminates the convergence problems generated because of the bounds on the parameter distributions. A transmission line with distributed series r, l and shunt c is a particular case of the distributed parameter system. The optimal design of a notched filter employing a thin film circuit is a successful example of the application of the improved gradient technique. These distributions have been obtained by the use of a hybrid computer.

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