NASA TECH BRIEF

Computer Program for Network Synthesis by Frequency Response Fit

The problem:

To design a program that can synthesize a passive network by minimizing the difference in desired frequency response and frequency response for the trial network.

The solution:

A program that uses as a synthesis criterion a weighted least squares fit between calculated and desired frequency response (called error function). The technique employed is to solve for the critical points of the error function by the multivariable Newton–Raphson method with components constrained to an admissible region. The program requirements are equations necessary in determining frequency response of prospective network and an initial estimate of component values.

How it's done:

For a given circuit configuration with a fixed input data, the error is a function of the variable components in the circuit. In other words, a change in any one of the variables will produce a related change in the error. Therefore, the partial derivative of the error function with respect to a variable component may be expressed in order to obtain the critical points. Thus, the technique can displace the error function to a relative maximum or a relative minimum as easily as it can force it to an absolute minimum. Therefore the appropriate logic is internal to the iterative scheme in order for the program to determine whether or not it is approaching a relative maximum or minimum, and if so, to provide a means for incrementing from that particular point.

Notes:

1. This program is written in Fortran IV (E-level subset) for use on the IBM 360.
2. Inquiries concerning this program may be directed to:

   > COSMIC
   > Computer Center
   > University of Georgia
   > Athens, Georgia 30601
   > Reference: B67-10406

Patent status:

No patent action is contemplated by NASA.

Source: Sidney Green
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