NASA TECH BRIEF

General Purpose Computer Programs for Numerically Analyzing Linear AC Electrical and Electronic Circuits for Steady-State Conditions

Two digital computer programs were developed to assist the electronics engineer in determining the steady-state performance characteristics of linear circuits, both active and passive. The first, an ac analysis program solves for the basic circuit parameters, such as current, voltage, and power. The second, a compiler program solves these circuit parameters and in addition provides a more versatile program by allowing the user to perform mathematical and logical operations, such as calculating the logarithm of the ratio of two node voltages or changing a circuit component value based upon the value of a circuit parameter.

A circuit is described to the computer in terms of parameter types and circuit topology, rather than as a set of equations. A set of matrices is generated from the input data to describe the circuit. These matrices are solved for a set of nodal voltages corresponding to a chosen frequency. These nodal voltages are then used to solve for the parameter voltage drops, currents, and power dissipation. This describes the frequency response of the prescribed parameters for the given frequency. Partial derivatives are solved directly from the matrices without having to solve the circuit equations. It is assumed that the circuit remains linear at the estimated operating point.

Notes:

1. This program was written in Fortran IV for an IBM 7094 computer.
2. Inquiries concerning this program may be directed to:

   COSMIC
   Computer Center
   University of Georgia
   Athens, Georgia 30601
   Reference: B67-10331

Patent status:

No patent action is contemplated by NASA.

Source: A. R. Thorbjornsen and R. A. Egebrecht
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