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Linear Circuit Analysis Program for IBM 1620 Monitor II, 1311/1443 Data Processing System (CIRCS)

The original set of linear circuit analysis programs called IBSNAP was developed for use on the IBM 7040/44 data processing system. There was an additional requirement for such a set of programs to be used on a smaller system such as the IBM 1620/20K version with a 1311 Disk Storage Drive. CIRCS is a modification of the original IBSNAP Circuit Analysis Program. Only the basic dc, transient analysis, and input language formats have been retained by CIRCS.

CIRCS can solve a linear network containing a maximum of 15 nodes (excluding ground) and 45 branches. Transistors and diodes can be included in the network as linear models and a special data card allows the user to describe the base, collector, and β or G_M characteristics of the transistor.

CIRCS is readily available for use on the IBM 1620/1311 Monitor I Mod 5 data processing system. (The dc and transient programs have been used on the IBM 1620/1311 Monitor II system with the 1443 printer.) Only a 20K Core Storage Unit is needed in addition to the 1311 Disk Storage Drive. The analysis portion of the ac and dc programs (ACNODE1 and DCNODE) have been so radically changed that only a similarity remains between CIRCS and IBSNAP. A Mandex Worst Case Analysis was added to the dc program in preference to the original dc worst case. The card processing programs (links AC, DC, TR) were written for use on the IBM 1620/1311 data processing system.

By modifying the necessary input parameter information using the partials as criteria, one can establish

a true worst case solution. The sensitivities computation in CIRCS gives the user a perspective as to the percentage effect a particular input parameter has on a particular node voltage with respect to the remaining input parameters.

Linear approximations for the differentials and integrals in the transient program are substituted, thereby reducing the system of differential equations to a system of algebraic equations. The trapezoidal rule is used in approximating the integrals. In order to model diodes, ramp functions, sawtooth functions, etc., switching is built into the program.

Notes:

1. The programming language is Fortran II.
2. Complete details of this program are contained in "A Linear Circuit-Analysis Program for the IBM 1620/1311, 20K Data Processing System, (CIRCS)," by J. N. Hatfield, Section Report No. 317-1, Jet Propulsion Laboratory, June 15, 1965. Copies are available from:

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Patent status:

No patent action is contemplated by NASA.

Source: J. Hatfield
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