THE NATIONAL COMPUTING CENTRE

Making analogue computers easier to handle

The National Computing Centre has developed a digital computer program which will cut, from weeks to a few hours, the time spent in setting up and checking out analogue computers.

APSE (Automatic Programming and Scaling of Equations) is eminently suitable for the solution of engineering and scientific problems on analogue computers. It also makes analogue machines more accessible to users, and reduces labour.

Work on the program was originally begun by a British Computer Society working party set up to develop procedures for a general-purpose program which would avoid the limitations of earlier programs in this field. As a result, APSE can be used for a wide range of problems, and can be used on most major digital machines.

Briefly, APSE performs the following processes:

(a) Input: reads in the equations and data and translates them to a form intelligible to the later routines. Equations are also checked for validity and consistency.

(b) Derivative sorting: reduces high order differential equations to a set of first order differential equations.

(c) Equation reduction: reduces the set of input and 'derivative sorted' equations to a larger set of simple (machine) equations, each of which represents the action of a single main analogue computer component.

(d) Equation ordering: derives an efficient order for the digital computer to use when solving the machine equations during the calculation of the static check; this order is that which requires, at each stage, the solution of the minimum number of equations simultaneously.

(e) Scaling: scales the machine equations for solution on the analogue computer.

(f) Static check: solves the scaled algebraic machine equations and calculates the values of derivatives.

(g) Assignment: allocates the analogue computer components to the various parts of the scaled machine equations.

(h) Output: prints the output information.

An enhanced version, termed APSE III, also performs the following functions:

(i) Dynamic check: integrates the scaled machine equations, step by step, over any desired range of the independent variable.

(j) Steady state solution: calculates the steady state solution of the scaled machine equations by either an algebraic or an integration method, as instructed by the user.

Both FORTRAN and ALGOL versions of APSE are available on five-year sublicences. They can be obtained from The National Computing Centre from around £3,000.