

NASA TECH BRIEF



NASA Tech Briefs are issued to summarize specific innovations derived from the U.S. space program, to encourage their commercial application. Copies are available to the public at 15 cents each from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151.

Computer Optimization Program Finds Values for Several Independent Variables that Minimize a Dependent Variable

This general purpose computer program uses a scheme that hunts for a set of values of the independent variables which minimize the dependent variable. As each independent variable is perturbed the dependent variable is examined. If it has either reached a new minimum or passed to the other side of the previous minimum the search increment is reduced and the search direction is reversed. If an acceleration is found to catch the search on the reverse side of a local minimum, the acceleration is discarded. Should one of these accelerations fail, a different type of acceleration is then used: the search increment is multiplied by a factor which increases by one at each successive step. When the previous minimum is passed, the search is backed off until the minimum is just passed by less than one increment. When three minimums have been found—simple, complex, and close to simple minimum—a variable is considered optimized. The independent variables are optimized in turn, until the last one is done, and then the process is repeated with the first. The cycle is repeated five times.

This program has been used on the F-1 and J-2 engine programs for computing film coolant injection slot spacing to establish minimum film coolant requirements for maintaining wall temperatures below a set value.

Notes:

1. The program has been written in Fortran H for use on the IBM 360 computer.
2. Inquiries concerning this program may be directed to:

COSMIC
Computer Center
University of Georgia
Athens, Georgia 30601
Reference: B67-10328

Patent status:

No patent action is contemplated by NASA.

Source: E. J. Warech
of North American Aviation, Inc.
under contract to
Marshall Space Flight Center
(MFS-13030)

Category 06

NASA TECH BRIEF



The purpose of this report is to provide a summary of the results of the research conducted in the area of the development of a computer program for the simulation of the behavior of a system of interconnected variables.

Computer Simulation Program Finds Values for Several Interdependent Variables that Minimize a Dependent Variable

This report describes a computer program that simulates the behavior of a system of interconnected variables. The program is designed to find the values of several independent variables that minimize a dependent variable.

The program is written in FORTRAN and runs on a CDC 3600 computer. It is designed to handle systems with up to 10 independent variables and 1 dependent variable.

The program is divided into three main sections: input, simulation, and output. The input section reads the data for the system and sets up the initial conditions.

The simulation section performs the calculations and determines the values of the independent variables that minimize the dependent variable.

The output section prints the results of the simulation, including the values of the independent variables and the value of the dependent variable.

The program is designed to be flexible and can be modified to handle different types of systems. It is also designed to be easy to use and can be run on a variety of computers.

The program is a valuable tool for the study of systems of interconnected variables. It can be used to find the optimal values of the independent variables for a wide variety of systems.

The program is available for use by NASA employees and is also available for use by other interested parties.

The program is a valuable tool for the study of systems of interconnected variables. It can be used to find the optimal values of the independent variables for a wide variety of systems.

The program is available for use by NASA employees and is also available for use by other interested parties.

