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Rm. 7-306

November 21, 1952

Mr. E. L. Harder
Member, Computers Committee
A. I. E. E.
Westinghouse Electric Corporation
East Pittsburgh, Pennsylvania

Dear Mr. Harder:

Enclosed you will find an abstract of the paper which I am to present at the A.I.E.E. Winter Meeting.

Please advise me of the details of this meeting as soon as your program has been formulated.

Very truly yours,

F. M. Verzuh
Director

V:T

Enclosure

P.M. Morse ✓

Solution of Boundary-Value Problems on Automatic Computing Equipment

by

Dr. Frank M. Verzuh

ABSTRACT

This paper is primarily concerned with the solution of boundary-value problems by means of automatic computing equipment (both analogue and digital). Specifically, in addition to the familiar desk calculator, the following digital computers were used in this study: the type 602A Electromechanical Calculator, the type 604 Electronic Calculator, the Card-Programmed Calculator, and the M.I.T. Whirlwind Computer. The anlogue studies were obtained by use of the M.I.T. Rockefeller Differential Analyzer.

This study is primarily concerned with the solution of ordinary differential equations in which certain boundary conditions are specified at two or more values of the independent variable. Such problems are generally called boundary-value problems. It is clearly evident that the solution of such problems is inherently more difficult than the solution of initial-value problems in which all conditions are specified at one point. The particular problems studies are further complicated by the fact that their solutions are required over an infinite range which contains regions of non-analyticity.

A computational philosophy is presented which emphasizes that a machine must be evaluated on a firm engineering and economic basis--a basis which must include the entire computational procedure. An evaluation is given of the relative advantages and limitations of the five computers used in this study.