

PREFACE

The purpose of STRESS is to facilitate the use of digital computers for the analysis of structures. In order to accomplish this purpose the communication between the structural engineer, who is normally not a programming expert, and the computer must be improved. The STRESS system is an attempt to achieve this objective by use of a problem-oriented input language that enables the engineer to write the complete input program for the solution of a structural problem even though he has had no programming experience.

The purpose of STRESS is not to make possible the solution of unusually large or complex structural problems, although its capability in this regard is considerable. The principal virtue of the system is that it can handle a wide variety of structural analyses with a minimum of programming effort. For example, STRESS can analyze structures in two or three dimensions, with either pinned or rigid joints, with prismatic or nonprismatic members, and subjected to concentrated or distributed loads, support motions, or temperature effects. With this capability available, we hope that the practicing engineer will find it economical to use a computer on a day-to-day basis for the solution of routine structural problems. In the educational field, STRESS will make possible the routine use of computers in the teaching of structural design.

Another important aspect of the system is the ease with which the engineer may obtain additional solutions for modifications of the original structure. This is particularly important in design that involves the evolution of a satisfactory structure by a trial process.

The STRESS version presented here is not considered to be a final or complete product. Work is currently under way to improve, refine, and add capabilities to the system; and it is expected that this will continue indefinitely.

This User's Manual is an attempt to present as concisely as possible the STRESS input language. The information contained herein should enable the engineer to fully utilize the present system. The internal programming is described in detail in the forthcoming STRESS Reference Manual, which is intended to enable extensive users to modify the system to suit best their own purposes.

Work on STRESS began in the Fall of 1962 under the direction of Professor S. J. Fenves of the University of Illinois who was a visiting member of the M. I. T. faculty during the year 1962-1963. The project staff

included Professor R. D. Logcher, Professor S. P. Mauch, Mr. K. F. Reinschmidt, and Mr. R. L. Wang. In the Fall of 1963 the project was placed under the general supervision of Professor J. M. Biggs with Professors Logcher and Mauch directly in charge of the programming effort. During the ensuing period important contributions were made to the debugging of the system by Professor Z. M. Elias, Mr. R. V. Goodman, Miss S. C. Finkelstein, Mr. S. G. Mazzotta, Mr. J. R. Roy, and Mr. A. C. Singhal.

The STRESS project has been partially supported from a major grant for the improvement of engineering education made to M.I.T. by the Ford Foundation. Additional support was provided by Project MAC, an M.I.T. research program, sponsored by the Advanced Research Project Agency, Department of Defense, under Office of Naval Research, Contract No. Nonr-4102(01). Reproduction in whole or in part is permitted for any purpose of the U.S. Government. The work was done in part at the M.I.T. Computation Center, and the aid and support of the Center and its personnel are gratefully acknowledged.