

## PREFACE

This report contains the edited transcripts of the Review of Progress in Quantitative Nondestructive Evaluation held at the Scripps Institution of Oceanography, July 14-18, 1980. The review was sponsored by the Defense Advanced Research Projects Agency and the Materials Laboratory of the Air Force Wright Aeronautical Laboratories as a part of the Interdisciplinary Program for Quantitative NDE, Contract No. F33615-80-C-5004. Arrangements for the Review were made by the Science Center, Rockwell International, host organization for the Interdisciplinary Program, and the Scripps Institution of Oceanography, Dr. William A. Nierenberg, Director.

The format selected for this review was the same as that adopted for previous meetings. This included a number of poster sessions in addition to the more traditional technical sessions. It has been found that the poster sessions provide a good way to accommodate the increased activity in this field while maintaining a forum that is highly conducive to technical interchange. As a further means of stimulating this exchange, a number of papers were included which are directly related to the principal technical interests of this program even though they were not directly sponsored by DARPA or the Air Force.

The program emphasized several areas of the progress in quantitative NDE. In addition to the work in quantitative ultrasonics, which has been a main program activity, the latest work in electromagnetic techniques and a proposed strategy for NDE of adhesive bonds was reported. A new concept that has received increasing attention over the past year is the concept of Retirement-For-Cause. Present efforts in this area were reviewed - an area in which advanced NDE techniques can have a very important and quantifiable impact on a major DOD system.

In all these areas, strong emphasis is placed upon the physical interpretation of the quantitative measurements and their evaluation in terms of appropriate failure models. Emphasis is also given in the program to presentations and discussions which address state-of-the-art knowledge related to the development of failure models for both ceramic and metallic materials, and the difference in such models required by the nature of the materials.

Dr. Arden L. Bement, Deputy Under Secretary for Defense Research and Advanced Technology, gave an excellent overview of reliability needs in future DOD systems. In his presentation, which is included in these Proceedings, he provided an overview of current thinking as to the threats facing this country and the future capabilities currently under development. Examined were the role of improved reliability in reducing operating and maintenance costs and increasing military capability, as well as the role of research and development in meeting future reliability requirements. Finally, some of the new policies initiated in the Defense Research and Advanced Technology organizations to develop a more effective R and D program were presented.

The organizers of the Review wish to acknowledge the financial support and encouragement provided by DARPA, the Air Force and the technical participation of members of the Materials Research Council. Special thanks are due to Dr. Bement for his overview. The organizers also wish to thank speakers, session chairmen, authors of poster presentations, and participants who collaborated to provide a stimulating meeting. They wish to acknowledge with thanks the assistance of Mrs. Diane Harris who managed the organizational matters of the meeting and who organized these Proceedings, and Mrs. Sarah Bergmann for her assistance at the meeting. They are also indebted to the management of the Scripps Institution of Oceanography, particularly Dr. William Nierenberg and Mrs. Shirlee Long, UCSD, for their cooperative support in the conduct of the meeting.