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WORKSHOP ON RESEARCH TECHNIQUES IN WAVE PROPAGATION AND
SCATTERING HELD O. (U) OHIO STATE UNIV COLUMBUS DEPT OF
ENGINEERING MECHANICS V V VARADAN ET AL. 12 MAY 83

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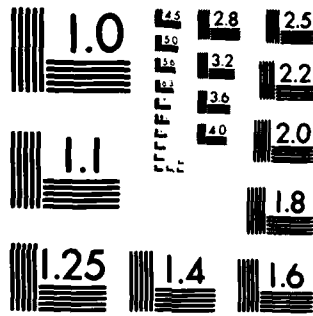
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FINAL REPORT ON

Workshop on Research Techniques
in
Wave Propagation and Scattering

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A Workshop/Symposium on Research Techniques in Wave Propagation and Scattering was held at the Ohio State University October 18-21, 1982. This workshop was co-sponsored with the generous financial support of the U.S. Army Research Office, U.S. Office of Naval Research, the Center for Welding Research, O.S.U. and the Department of Engineering Mechanics, O.S.U. Professors Vijay K. Varadan and Vasundara V. Varadan, of the Department of Engineering Mechanics, O.S.U., directed the conference activities with the able assistance of Ms. Judy L. Gerber who was conference coordinator. In addition, the organizers wish to acknowledge the help of Dr. Yushieh Ma, Dr. T.A.K. Pillai, Mr. S.J. Tsao, Mr. S. Baskar and Mr. N. Sonti with all the arrangements.

The workshop format consisted of a core of general lectures of fifty minutes duration each and several shorter contributions that were of twenty minutes duration each. In addition, there were three panel discussions. The general lectures were of an expository nature on fundamental concepts and basic analytical/numerical techniques for the solution of wave scattering and propagation problems. The speakers were noted for their contribution to these techniques and in many cases have pioneered the techniques that they elaborated upon. These lectures were invaluable to the participants since they were of a pedagogical nature and easily understood by even those not very familiar with the particular method. The written version of many of these lectures will appear in a four volume Handbook on Acoustic, Electromagnetic and Elastic Wave



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Scattering to be published by North Holland as a separate project. Each volume will consist of in-depth treatments of the analytical, numerical and experimental techniques and are expected to be a significant contribution to the literature and a valuable source of reference. The general lectures and speakers are listed below.

"Rayleigh Scattering," by T.B.A. Senior and R.E. Kleinman

"Matched Asymptotic Expansions Applied to Diffraction of Elastic Waves," by S.K. Datta and F.J. Sabina

"Moment Method Approach to Electromagnetic Wave Scattering," by R.F. Harrington

"A Uniform GTD Approach to EM Scattering and Radiation," by R.G. Kouyoumjian and P.H. Pathak

"Ray and Modal Techniques for Time-Harmonic and Transient Propagation Along, and Scattering by, Convex Objects," by L.B. Felsen and E. Heyman

"Edge Diffraction in Acoustics and Elastodynamics," by J.D. Achenbach and A.K. Gautesen

"Transform Techniques for Solving Electromagnetic Scattering Problems," by R. Mittra and R. Kastner

"T-Matrix Approach to Acoustic, Electromagnetic and Elastic Wave Scattering," by V.V. Varadan and V.K. Varadan

"Near-Field Scattering Measurements," by C.E. Ryan

"Unimoment Method for Electromagnetic Wave Scattering," by K.K. Mei and T.M. Kvan

"Experimental Methods in Acoustic Scattering," by S.K. Numrich and L.R. Dragonette

"Experimental Studies of Elastic Wave Scattering," by B.R. Tittmann and L. Adler

"Three-Dimensional Scattering of Pulsed Elastic Waves by a Penetrable Obstacle (Integral-Equation Technique)," by A.T. de Hoop

"Some Aspects of Recent Work in Quantum Particle Scattering and Its Relation to Wave Scattering," by R.G. Newton

"Inverse Modelling in Remote Sensing," W.M. Boerner

"Wavefront Fields in the Scattering of Elastic Waves by Surface-Breaking and Sub-Surface Cracks," by J. Miklowitz

The general lectures with which each session began were complemented by the shorter presentations which focussed on current applications of the basic technique to problems of practical interest. There was a total of 26 papers in this category.

In addition, the participants greatly enjoyed the special lecture given by Professor Roger Newton who is well known for his work in inverse scattering.

The active participation of Professors de Hoop, Felsen, Mittra, Harrington, Bennett, Achenbach and others in the panel discussions was highly appreciated. On the final day, just before the workshop adjourned, Dr. N.L. Basdekas, ONR; Dr. J. Greenberg, O.S.U.; Dr. Walter Flood, ARO; and Dr. C. Holland, ONR, had a discussion on problems of current interest in wave propagation and scattering.

The social activities of the workshop included a reception on October 17 hosted by the Center for Welding Research and a banquet on October 20. A tour of the Electro-Science Laboratory and the Center for Welding Research was arranged for interested participants.

One of the strong recommendations that emerged from the panel discussions was that all numerical techniques should also come up with some measure of the error in the numerical calculations. This was thought to be a weakness of some of the currently popular techniques. Since this is the second such meeting that has been organized, we were really pleased to see that some

scientists who have traditionally worked on electromagnetic wave problems are attempting to apply their techniques to elastic wave problems and vice versa. This cross-fertilization and interaction is an important objective of all such workshops. The research community can greatly benefit from such exchanges.

It was originally planned to publish selected short contributions to the workshop in a special issue of the Journal of Wave Motion. A total of ten manuscripts were received and forwarded to Professor J.D. Achenbach, the Editor-in-Chief of the journal. These manuscripts will be subject to the usual review for a journal publication and many of them eventually will be published. We have, however, been informed that it would not be possible to accommodate all papers in one issue of the journal. The papers will be published as they become ready with a footnote indicating that it was first presented at the workshop held here at O.S.U.

Once again we thank Dr. Walter Flood of ARO, Dr. Richard Brandt of ONR, Professor Karl Graff of the Center for Welding Research and Professor Sunder Advani, Department of Engineering Mechanics, for their support and encouragement. We sincerely believe that the workshop was a great success and a valuable experience to all the participants.