

PREFACE

The Office of Naval Research and the Massachusetts Institute of Technology co-sponsored an International Symposium on Structures Technology for Large Radio and Radar Telescope Systems held at M.I.T. from 18 to 20 October 1967. Topics which were covered included stress analysis of complex structures, radome design, passive and active control of antenna shape, structural features of existing large radio telescopes, design studies of proposed telescopes, as well as background papers on radio and radar astronomy. The primary emphasis was on the problem areas associated with very large radio and radar astronomy systems, and with the tools used for their structural design.

Sessions were held in the Little Theatre of Kresge Auditorium in the morning and afternoon. On Friday afternoon there was a trip to the Lincoln Laboratory Haystack Facility located in Westford, Massachusetts, wherein is located the 120-foot diameter, steerable antenna inside of a 150-foot diameter radome.

There was a banquet at the M.I.T. Faculty Club on Thursday evening. After dinner there was a panel discussion of the future needs and requirements of radio and radar astronomy.

It was evident from the papers that a very large radio telescope is feasible and furthermore that the structures' community sees in the design and construction of such a system many extremely interesting and challenging problems. The requirement that the parabolic shape of the antenna remain within very close tolerances, the trade-offs involved in a radome enclosure for

the antenna, the desire not to be limited operationally by moderate winds and temperature excursions and, above all, the need to minimize costs are system parameters which will require engineering of the highest order. It became evident, also, that the design will require close collaboration between the hardware designers and the astronomers who will be the users.

The complete program follows:

Wednesday morning session: October 18, 1967, 9:30 a.m.

Session Chairman: E. M. Purcell, Harvard University

Jerome B. Wiesner: Welcome

E. G. Bowen, "The Design and Application of Large Steerable Telescopes"

A. B. Youmans, "Design of a 300-foot Research Antenna"

O. Hachenberg, "Design of the Bonn University 100-meter Telescope"

H. G. Weiss, "Design Studies for a 440-foot-diameter Radio/Radar Telescope"

Wednesday afternoon session: October 18, 1967, 1:45 p.m.

Session Chairman: J. W. Mar, M.I.T.

C. Scruton, "Some Considerations of Wind Effects on Large Structures"

M. S. Katow, "Techniques Used to Evaluate the Performance of the NASA/JPL 210-foot Reflector Structure Under Environmental Loads"

T. G. Butler, "Analytical Determination of the Structural Transfer Functions of the ROSMAN I Tracking Antenna"

M. H. Jeffery, "Construction and Performance of the 150-foot NRC Antenna at Algonquin Radio Observatory, Ontario, Canada"

I. K. Shah, H. Simpson, and H. D. Smith, "On the Prediction of Antenna Deformations"

Thursday morning session: October 19, 1967, 9:00 a.m.

Session Chairman: W. H. Gayman, Jet Propulsion Laboratory

H. C. Minnett, D. E. Yabsley, and M. J. Puttock, "Structural Performance of the Parkes 210-foot Paraboloid"

H. A. Cress and S. G. Talbert, "Determination of Approximate Structural Parameters of a Large Steerable Antenna"

W. Weaver, Jr., "Computer-Aided Design of a Large Steerable Antenna Structure"

H. Rothman and F. K. Chang, "Maintaining Surface Accuracy of Large Radio Telescopes by Active Compensation"

P. Weidlinger, "Control of RMS Surface Error in Large Antenna Structures"

Thursday afternoon session: October 19, 1967, 1:45 p.m.

Session Chairman: N. Harper, Skidmore, Owings, Merrill

A. D. Kuzmin and P. D. Kalachev, * "Structures of Large Radio Telescopes"

*Unfortunately, Dr. Kuzmin and Dr. Kalachev could not be present. Mr. Fanning presented a summary.

- S. von Hoerner, "Homologous Deformations of Tilttable Telescopes"
D. R. Strome and B. E. Greene, "ASTRA—Boeing's Advanced Structural Analyzer"
C. W. McCormick, "Application of the NASA General Purpose Structural Analysis Program to Large Radio Telescopes"
R. D. Logcher, "ICES STRUDL—An Integrated Approach to a Structural Computer System"

Friday morning session: October 20, 1967, 9:00 a.m.

Session Chairman: M. J. Holley, M.I.T.

- J. Ruze, "Electromagnetic Loss of Metal Space Frames"
R. D'Amato, "Metal Space Frame Radome Design"
D. T. Wright, "Instability in Reticulated Spheroids: Experimental Results and the Effects of Nodal Imperfections"
L. Berke and R. H. Mallett, "Automated Large Deflection and Stability Analysis of Three-Dimensional Bar Structures"
J. J. Connor, "Non-Linear Analysis of Elastic Framed Structures"

Friday afternoon session: October 20, 1967, 1:45 p.m.

Haystack Visit. Buses leave from Kresge Auditorium parking lot.

- G. Pettingill, "The Scientific Program at the Haystack Facility"
W. R. Fanning, F. A. Folino, R. A. Muldoon, and H. G. Weiss, "Design of the Haystack Facility"

Papers which could not be presented but which are part of this volume are as follows:

- M. Ginat, "The Nançay Radio Telescope"
Lewis V. Smith, Jr., "Pointing and Tracking Accuracy. Recommended Standards"
S. Dean Lewis and E. A. Witmer, "Buckling Tests on Space Frame Radome"

Finally, it is a pleasure to express thanks to some of the many persons who contributed valuably to the Symposium: to the program committee, J. M. Crowley, M. J. Holley, Jr. and H. G. Weiss, and to Miss Ann Gorrasi who handled all the voluminous details with great effectiveness and good humor.

J. W. Mar
H. Liebowitz
Co-Chairman of the Symposium