1985
Microwave Career Award

Nathan Marcuvitz

The Microwave Career Award is presented to an individual "for a career of meritorious achievement and outstanding technical contribution in the field of microwave theory and techniques." The 1985 Microwave Career Award has been awarded to Dr. Nathan Marcuvitz.

Nathan Marcuvitz was born December 29, 1913 in New York, New York. He received the B.S. degree in electrical engineering in 1935, the M.S. degree in 1941, and the Doctorate in electrophysics in 1947 all from the Polytechnic Institute of Brooklyn. He joined the RCA Laboratories as a student engineer in 1936 and performed research on electron tubes, iconoscopes, and orthicons for television applications. Dr. Marcuvitz joined the Radiation Laboratory of the Massachusetts Institute of Technology in December 1941 where he was engaged in microwave research until 1946.

Dr. Marcuvitz returned to the Polytechnic Institute of Brooklyn in 1946 as an assistant professor in the Department of Electrical Engineering. He obtained an associate professorship in 1949 and a full professorship in 1951. In 1957, he was appointed Director of the Microwave Research Institute, serving in this capacity until 1961, when he became Chairman of the newly formed Department of Electrophysics. Shortly thereafter and until 1963, Dr. Marcuvitz served as Vice-President of research as well as Acting Dean of the Graduate Center.

On leave from the Polytechnic Institute of Brooklyn, Dr. Marcuvitz became Assistant Director of Defense Research and Engineering for the Department of Defense in Washington, D.C. from 1963 to 1964. He was then appointed Dean of Research and Dean of the Graduate Center at the Polytechnic Institute of Brooklyn. In 1965 he became an Institute Professor, the first appointment of this kind at the Polytechnic.

In February 1966, Dr. Marcuvitz joined the faculty of the School of Engineering and Science at New York University as Professor of Applied Physics. He returned to the newly merged Polytechnic Institute of New York with the same position and is currently an Institute Professor.

Dr. Marcuvitz has over thirty publications or paper presentations. He edited the **Waveguide Handbook**, Volume 10, and wrote Chapter 8 of **Principles of Microwave Circuits**, Volume 8, of the MIT Radiation Laboratory Series. With L. Felsen, he coauthored the book **Radiation and Scattering of Waves** which was published in 1973.

One of Dr. Marcuvitz's most important contributions was the microwave network formulation of electromagnetic field problems. During World War II, he helped to rephrase Schwinger's theoretical results in engineering terms. His work was very systematic and thorough. He exerted great influence through his seminars on collegues and students. As an extension of this work, Dr. Marcuvitz also derived transmission line formulations for nonuniform waveguides and for periodic structures. He developed radial transmission line theory and spherical transmission line theory. His approach for periodic structures has been widely used.

During World War II at the MIT Radiation Laboratory, he developed precision microwave measurement methods for waveguide discontinuities and coordinated them with theoretical results derived by Schwinger and others. He showed that the results for small aperture theory derived first by Lord Rayleigh and later by H. A. Bethe can be deduced rigorously from general theoretical considerations. He rephrased the results in simple and practical engineering form. He then used the method to derive theoretical expressions for many new discontinuity structures. Almost one-third of the discontinuities contained in the **Waveguide Handbook** were treated in this way by Dr. Marcuvitz.

There was much confusion during the 1950's regarding the physical nature of leaky waves. Dr. Marcuvitz was the first to explain them and to show how to compute their properties. In later years, he tackled some very difficult problems, including nonlinear and turbulent plasmas. He attempted to simplify such problems by using microwave network formulations and by introducing "quasi-particles."

Dr. Marcuvitz was elected to the National Academy of Engineering in 1978. He is also a Fellow of the IEEE, a member of the American Physical Society, Tau Beta Pi, Eta Kappa Nu, and Sigma Xi.