

Application of Rayleigh-Ritz Method to Dielectric Steps in Waveguides*

Collin and Vaillancourt¹ write that in a previous paper of mine²: "the coupling of the LSE modes by the step when a LSM mode is incident is neglected."

This remark is true, only in reference to the approximate numerical results obtained in my paper, but does not apply to the varia-

tional expressions. All derivations and results about the four-terminal network equivalent to the discontinuity, are perfectly general and include Hy as well as Ey modes. The summations in all the expressions in my paper extend to both types of modes.

The particular trial field chosen for the numerical computation of the admittance is such that the contribution of the Hy modes is zero. It is with this thought in mind that I asked the reader, at the beginning of the paper, to ignore the Hy modes. I did not mean to say that they are not excited. In fact, if another trial field is inserted into the expressions given for the admittances in my paper, they will yield contributions from the Hy modes.

It is actually very easy to show that Hy modes are excited at the discontinuity, simply by matching all the fields at that plane.

In my thesis at the Polytechnic Institute of Brooklyn, I discussed both types of modes. My intention in the paper, was to reduce its length to a minimum by not including the Hy mode functions.

This opportunity to point out the generality of the theory and the limitations of the numerical results, I owe to Dr. Collin who, before the publication of his paper, called my attention to the possibility of misinterpreting the statement in mine.

CARLOS M. ANGULO
Brown University
Providence, R. I.

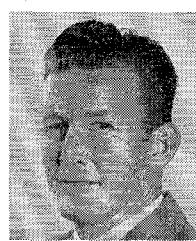
* Received by the PGMMT, June 21, 1957.

¹ R. E. Collin and R. Vaillancourt, IRE TRANS., vol. MTT-5, pp. 177-184; July, 1957.

² C. M. Angulo, "Discontinuities in a rectangular waveguide partially filled with dielectric," IRE TRANS., vol. MTT-5, pp. 68-74; January, 1957.

Contributors

Wesley P. Ayres (M'56) was born on September 26, 1924, at Los Angeles, Calif. He served as an electronic technician aboard a destroyer during World War II. He returned to college in 1948 and received the B.S. degree in physics from Fresno State College in 1951. He then entered Stanford University where he received the M.S. degree in 1953, and the Ph.D. degree in physics in 1954. In 1954, he joined the Electronic Defense Laboratory of Sylvania Electric Products, Inc., Mountain View, Calif., where he engaged in ferrite research at microwave frequencies. In 1956, Dr. Ayres helped to found Microwave Engineering Laboratories, Inc., Palo Alto, Calif., where he is presently doing research on microwave components.



W. P. AYRES

Dr. Ayres is a member of RESA and the American Physical Society.

stitute in Brooklyn as Research Associate. He is currently employed by the Raytheon Manufacturing Company doing work on microwave ferrite devices with the Special Microwave Device Group.

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Kenneth R. Bushore was born in San Diego, Calif., on April 27, 1915. After graduating from the Navy's Radio Materiel Schools at Chicago, Ill., Del Monte, Calif., and Treasure Island, Calif., he served as an electronic technician with the Pacific fleet during World War II.

In 1949, Mr. Bushore was employed by the Navy Electronics Laboratory, San Diego, Calif., where he engaged in microwave research and development as a member of the Microwave Components Group of the Radar Branch from 1950 until early 1957. He is currently a member of a newly organized group at N.E.L. which is investigating optical system applications for radar use.

Robert S. Elliott (A'51-SM'53) was born in Brooklyn, N. Y., on March 9, 1921. He was a Pulitzer Scholar at Columbia University, New York, N. Y., where he received the A.B. degree in 1942 and the B.S. degree in 1943.

From 1943 to 1946, he was employed by the Applied Physics Laboratory of Johns Hopkins University, serving as a junior engineer on problems in radar, guided missiles, and the proximity fuse. In 1946, he became a member of the electrical engineering staff



K. R. BUSHORE

at the University of Illinois, where his duties included undergraduate and graduate teaching and research in antennas and microwave tubes. While at Illinois he received the M.S. degree in 1947, and the Ph.D. degree in 1952.

Summer employment in the antenna groups at Sperry Gyroscope Co. in 1949, and North American Aviation, in 1950, supplemented his Illinois employment. Upon leaving Illinois in 1952, Dr. Elliott served one year of active duty in the U. S. Navy and then joined the technical staff of the Hughes Aircraft Company, where he was in charge of the antenna research section of the Microwave Laboratory. At Hughes, Dr. Elliott specialized in surface wave antennas and uhf arrays. He is presently technical director and vice-president of the RANTEC Corporation.

He is a member of Tau Beta Pi and Sigma Xi.

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Elizabeth Laverick (SM'55) was born in Amersham, Buckinghamshire, England in November, 1925. She received the B.S. de-

gree in physics from Durham University in 1946, and the Ph.D. degree in 1950. From 1950 to 1953, she worked at the Research Laboratories of the General Electric Company, Ltd., at Stanmore, Middlesex, in charge of a section on microwave antennas. In Decem-

Saul M. Bergmann (M'56) was born in Antwerp, Belgium, on September 7, 1927. He graduated in electrical engineering from the Institute of Technology, Haifa, Israel, in 1951. He then joined the Societe Belge-Radio-Electrique in Brussels.

From 1953 to 1956 he did postgraduate work in physics at the University of London under R. Furth. He then joined the Microwave Research In-

S. M. BERGMANN



E. LAVERICK

ber, 1953; she joined Elliott Brothers (London), Ltd., where she is head of the research group in the Microwave Division of that company. This group is currently engaged on investigation into microstrip, ferrite devices, antenna design and millimeter wave techniques.

Miss Laverick is an associate member of the IEE and Institute of Physics.



L. E. NORTON

Mr. Norton is a member of Sigma Xi.

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Lowell E. Norton was born on August 12, 1909, in Arlington, Minn. He received the B.S. degree in electrical engineering in 1932,

and the M.S. degree in communications in 1935, both from the University of Minnesota.

He entered the services of the Research Division of the RCA Manufacturing Company at Camden, N. J., in 1935, and since 1942, has been at RCA Laboratories, Princeton, N. J.

Mr. Norton is a member of Sigma Xi.

transmission lines. In 1955, he was appointed consultant to the newly formed Special Systems and Components Department.

He is a member of the American Physical Society.

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Peter A. Rizzi (S'50-A'54-M'57) was born in Providence, R. I., on December 10, 1930. He received the B.S. degree with high honors

from the University of Rhode Island in 1951, and the M.E. and D.E. degrees in electrical engineering from Yale University in 1952 and 1955. During his graduate studies, he received the Yale University Scholarship and the Charles LeGeyt Forrescue Fellowship.

Since August, 1954, Dr. Rizzi has been engaged in the development of microwave components at the Missile Systems Division of the Raytheon Manufacturing Company where he is presently head of the ferrite section.

Dr. Rizzi is a member of Phi Kappa Phi, Sigma Xi, and Tau Beta Pi.



P. A. RIZZI

He is a member of Sigma Xi, RESA, and Eta Kappa Nu.

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Wallis L. Teeter (A'47-SM'53) was born in Kansas in 1923. He received the B.S. degree from Kansas State College in February, 1947.



W. L. TEETER

From 1944 to 1946, while in the Navy, he was in the Centimeter Wave Research Section at the Naval Research Laboratory in Washington, D. C. He joined the U. S. Navy Electronics Laboratory in 1947, where he was a group leader in the Radar Equipment Section in charge of

uhf and microwave component design for the Radar Branch. In 1956, he joined the Palo Alto Research Laboratory of Lockheed Missile Systems Division where he is presently a group leader in the Radar and Data Link Department.

Mr. Teeter is a registered professional engineer and a member of Eta Kappa Nu and Sigma Tau.

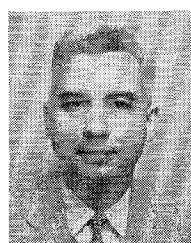
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Lucien G. Virgile was born in New York, N. Y., on January 11, 1925. He received the Bachelor degree in aeronautical engineering

from the Polytechnic Institute of Brooklyn in 1944 and the M.S. degree in mechanical engineering from Stanford University in 1948. He was engaged as a materials and process engineer for the Bell Aircraft Corporation from 1944 to 1945, and as a structural design engineer for Fairchild Aircraft

Corporation from 1946 to 1947. From 1948 to 1949, he was associated with the George S. May Company as a consulting engineer and subsequently was owner-manager of a design studio for four years. Since 1953, Mr. Virgile has been employed by the Sperry Gyroscope Company where he is presently product engineer responsible for mechanical engineering development and production of a wide variety of microwave systems and components.

Mr. Virgile is a member of Tau Beta Pi.



F. SHNURER

Florian Shnurer was born on May 29, 1929, in Blakely, Pa. He entered Union College in 1946 and received the B.S.E.E. degree in 1950. In 1952, he received the M.S. degree from Northwestern University, Evanston, Ill., for which he did research in coated conductor antennas. He is a candidate for a Ph.D. from the same university.

From 1950 to 1954, he was a research associate in the Microwave Laboratory at Northwestern University, where he did research in microwave antennas.

In 1954, Mr. Shnurer joined the General Electric Advanced Electronics Center at Cornell University as an engineer in the Electronic Warfare Subsection where he is presently engaged in working on special microwave circuits.

K. S. PACKARD

Mr. Packard is a member of the National Carbon Company where he worked on the proximity fuze and later on dielectric heating.

In 1946, Mr. Packard joined Airborne Instruments Laboratory, Mineola, N. Y., as a project engineer. He has been responsible for the development of equipment for magnetic surveying, automatic swr and impedance plotting, and video recording and reproduction. More recently he has been engaged in the development of microwave systems and components, particularly in the field of strip

