ferent parameters. The waveguide cross-section ratio is taken as $a/b = 2$. The effect of the permittivity ϵ_r appears in Figs. 2 and 3, respectively, for slabs next to the waveguide wall and at the waveguide center, for $t/b = 0.2$. Fig. 4 shows the effect of slab thickness for $\epsilon_r = 9$ and $d_1 = 0$. The dotted lines show the appearance of the higher order modes.

To the readers who would be interested in other values of the parameters, for either H-plane or E-plane slabs, the authors would be pleased to send a copy of the computer listing, written in IBM 360 FORTRAN IV BOS.

When the dielectric slab is next to the guide wall (Figs. 2 and 4), the dominant mode is the LSM_{11} ("quasi TE_{10}"). The frequency bandwidth is limited by the appearance of the LSM_{21} mode at low values of t/b, or of the TE_{01} for large values of t/b.

When the slab is moved away from the guide wall (Fig. 3), the cutoff frequency of the TE_{01} mode decreases much faster than that of the LSM_{11} mode when ϵ_r increases. Eventually, for large values of ϵ_r, the TE_{01} becomes the dominant mode, the bandwidth being then limited by the LSE_{11} mode. It is worthwhile noting that, for certain values of ϵ_r and t/b, the dispersion curves of the TE_{01} and LSM_{11} modes cross each other: at that frequency, the phase velocities of the two modes are the same, their group velocities being different. This effect may be of interest in the design of filters.

It should be noted that, in most practical devices making use of H-plane loading, the slabs do not extend entirely across the waveguide. The results obtained here are not directly applicable to such devices, but may nevertheless give valuable information. For instance, the gaps in the dielectric can be considered as perturbations of the complete H-plane structure, and approximate results can be obtained using perturbation techniques.

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Contributors
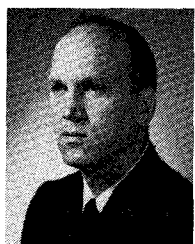
Edward G. Cristal (S'58 – M'61 – SM'66) was born in St. Louis, Mo., on January 27, 1935. He received the B.S. and A.B. degrees in electrical engineering and mathematics in 1957 and the M.S. degree in electrical engineering in 1958 from Washington University, St. Louis. In 1961 he received the Ph.D. degree in electrical engineering from the University of Wisconsin, Madison.

He joined the staff of the Electromagnetic Techniques Laboratory of the Stanford Research Institute, Menlo Park, Calif., in 1961 and has since been engaged in applied research and development of microwave and UHF components.

Dr. Cristal is a member of the Scientific Research Society of America.

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Gerald J. Herskowitz (M'60-SM'68) was born in Brooklyn, N. Y., on February 20, 1936. He received the B.E.E. degree from the Polytechnic Institute of Brooklyn, Brooklyn, in 1957, the M.S. degree in electrical engineering from Rutgers University, New Brunswick, N. J., in 1959, and the Eng.Sc.D. degree from New York University, the Bronx, N. Y., in 1963.

From 1957 to 1959 he was employed by the RCA Laboratories, Princeton, N. J., where he worked on satellite electronic circuits. He taught at New York University and performed research on solid-state devices and integrated circuits in the Department of Electrical Engineering from 1959 to 1963. He joined Bell Telephone Laboratories, Murray Hill, N. J., in 1963, where he continued research on solid-state devices and integrated circuits, with particular application to magnetic memory systems. In 1965, he became a member of the faculty of the Department of Electrical Engineering, Stevens Institute of Technology, Hoboken, N. J., where he has been teaching courses and performing research on optical and microwave solid-state devices, integrated circuits, and computer-aided analysis and design. He is currently an Associate Professor of Electrical Engineering at Stevens.

Dr. Herskowitz is a member of Sigma Xi, Tau Beta Pi, Eta Kappa Nu, and ASEE.

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Masao Kamimura was born in Sapporo, Japan, on September 15, 1926. He graduated from the electrical engineering course, Hokkaido University, Sapporo, in 1952, and received the Dr.Eng. degree in 1962 from the same university.

From 1952 to 1954 he worked at Japan Broadcasting Corporation. From 1954 to 1958 he was an Assistant in the Faculty of Engineering at the Hokkaido University, where he was engaged in research on microwave circuits. In 1958 he became an Instructor at Muroran University, Hokkaido Prefecture, Japan. He joined the Central Research Laboratory, Hitachi Ltd., Tokyo, Japan, in 1960, where he is engaged in research on the microwave transmission line and antenna.

Dr. Kamimura is a member of the Institute of Electronics and Communication Engineers of Japan.

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Clark N. Kurtz (S'66) was born in Stillwater, Minn., on November 24, 1937. He received the B.S. degree from South Dakota School of Mines and Technology, Rapid City, in 1959, and the M.S. degree from the University of Illinois, Urbana, in 1963. He received the Ph.D. degree from the University of Rochester, Rochester, N. Y., in 1967. His studies were in the field of

electrical engineering and his dissertation was a theoretical study of guided waves in inhomogeneous media.

He joined Eastman Kodak as a design engineer in 1959. Since 1967, he has been with the Physics Division of the Eastman Kodak Research Laboratories where he has been engaged in holographic research.

Dr. Kurtz is a member of the American Institute of Physics, the Optical Society of America, Eta Kappa Nu, Sigma Tau, and Sigma Xi.

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Koich Mikoshiba (M'67) was born in Nagano, Japan, on March 22, 1937. He received the B.S. degree in electrical engineering and the Ph.D. degree in engineering from the University of Tohoku, Tohoku, Japan, in 1959 and 1967, respectively.

In 1959, he joined Hitachi Cable, Ltd., Tokyo, Japan, where he has been a Research Member of the Research Division. He has been engaged in the development of millimeter circular waveguides and UHF antenna systems for TV broadcasting, and in the research and application of such nonconventional waveguides as surface waveguides, leaky waveguides, and beam waveguides.

Dr. Mikoshiba is a member of the Institute of Electronics and Communication Engineers of Japan.

Joseph R. Nevarez (M'67) was born in Las Cruces, N. Mex., on September 14, 1939. He received the B.S.E.E. degree from New Mexico State University, University Park, in 1962, and the M.E.E. degree from Stevens Institute of Technology, Hoboken, N. J., in 1968.

He joined Bell Telephone Laboratories, White Sands Missile Range, N. Mex., in 1962 and worked on antenna pattern testing of phased array radars. He was transferred to the Radar Exploratory Development Group at Bell Telephone Laboratories, Whippany, N. J., in 1964, where he has been conducting studies on microwave solid-state power generation and control. He is currently a Member of the Technical Staff.

Mr. Nevarez is a member of Eta Kappa Nu and Sigma Tau, and an associate member of Sigma Xi.

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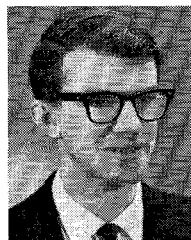
Donald H. Sinnott (M'68) was born in Melbourne, Australia, on March 17, 1944. He received the B.E. and M.Eng.Sc. degrees from the University of Melbourne in 1966 and 1967, respectively.

Since 1967 he has been with Weapons Research Establishment, Salisbury, South Australia, where he is working on the application of finite difference techniques to the solution of electromagnetic problems.

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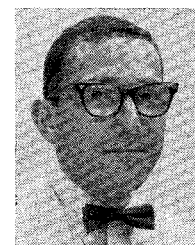
William Streifer (S'56–M'58) was born in Przemysl, Poland, on September 13, 1936. He received the B.E.E. degree from the College of the City of New York, N. Y., in 1957, the M.S. degree from Columbia University, New York, N. Y., in 1959, and the Ph.D. degree from Brown University, Providence, R. I., in 1962.

From 1957 to 1959 he was a Lecturer in electrical engineering at the College of the City of New York and part-time Research Engineer at the Heat and Mass Flow Analyzer Laboratory, Columbia University. While at Brown University he held a National Science Foundation Cooperative Fellowship (1959–1960) and a Bell Telephone Laboratories Fellowship (1960–1961). Since 1962 he has been with the Department of Electrical Engineering at the University of Rochester, Rochester, N. Y., where he is presently Associate Professor. His interests include electromagnetic theory, optics, and applied mathematics.

Dr. Streifer is a member of the Optical Society of America, Sigma Xi, and Tau Beta Pi.