

# Letters

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## Correction to "Theory of an Efficient Electronic Phase Shifter Employing a Multilayer Dielectric-Waveguide Structure"

A. B. BUCKMAN

A factor of  $n_g$  should appear in the numerator of the right side of (11).<sup>1</sup> This error affects the design of the structure in Fig. 3,<sup>1</sup> as follows: To obtain values of  $\Delta\phi/\Delta l$  of the order 50–80°/cm, it is necessary that  $d_g/\lambda_0$  be raised to 0.4375, and an additional layer of refractive index 3.4 and thickness 0.4375  $\lambda_0$  be placed between the active layer and the superstrate. Other indices and thicknesses remain unchanged.

Manuscript received July 18, 1977.

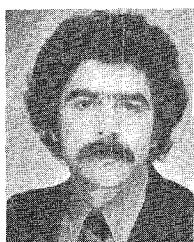
The author is with the Department of Electrical Engineering, the University of Texas at Austin, Austin, TX 78712.

<sup>1</sup> A. B. Buckman, *IEEE Trans. Microwave Theory Tech.*, vol. MTT-25, pp. 480–483, June 1977.

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# Contributors

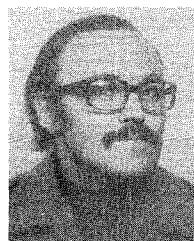
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**Majid Ahmadpanah** was born in Kashmar, Iran, in 1948. He received the B.S. degree in electrical engineering from the Pahlavi University, Shiraz, Iran, in 1971, and the Dipl. Doc. Ing. degree in microwaves from the Paul Sabatier University, Toulouse, France, in 1977.

From 1971 to 1973, he worked as an Instructor in the Technical School of Electronics, Shiraz, Iran. In 1973, he got a scholarship from the French Government to continue his studies in microwaves. In 1974, he joined "Laboratoire de Microondes" where he has been engaged in research on periodic structures in microelectronics.

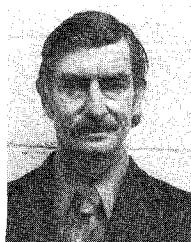
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**Raymond Crampagne** was born in France in 1946. He received the Dipl. d'Ing. degree in electrical engineering from Ecole Supérieure d'Electricité, Paris, in 1968, and the Doctorat de 3ème cycle degree in microwaves from the Paul Sabatier University, Toulouse, France, in 1973.

In 1968, he joined "Laboratoire de Microondes," Toulouse, where he studied in particular the determination of the electromagnetic field in guiding structures. He is currently employed as Assistant at Institut National Polytechnique de

Toulouse, where he continues his research on delay lines and periodic structures in the microwaves.



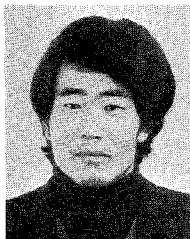
**Leopold B. Felsen** (S'47-A'53-M'54-SM'55-F'62) was born in Munich, Germany, on May 7, 1924. He received the B.E.E., M.E.E., and D.E.E. degrees from the Polytechnic Institute of Brooklyn, Brooklyn, NY, in 1948, 1949, and 1952, respectively.

During World War II he was concerned with work on electronic ballistics-calibration devices in the U.S. Army. Since 1948 he has been with Polytechnic Institute of Brooklyn, now Polytechnic Institute of New York, first with its Microwave Research Institute, and presently with its Department of Electrical Engineering where he holds the position of Professor. In September 1974, he was appointed Dean of Engineering. On a leave of absence during 1960–1961 he served as a Liaison Scientist with the London Branch of the Office of Naval Research. His research work has dealt with a variety of areas in electromagnetic radiation and diffraction theory, and his present interest is centered primarily on quasioptic techniques, optical waveguides, and optical resonators. He has been teaching graduate courses on various topics in electromagnetic theory, and during the summer of 1967 he was a Visiting Professor at the University of Colorado, Boulder. During September 1967 he was in Russia as an invited guest of the Soviet Academy of Sciences for the purpose of lecturing and scientific discussion, and he was also their invited guest to attend the 1971 Electromagnetic Theory Symposium in Tbilisi, USSR. He was awarded a Guggenheim Fellowship for 1973. In 1974, he was appointed a Distinguished Lecturer for the Antennas and Propagation Society. He received the 1975 Balthasar van der Pol Gold Medal, awarded triennially by the International Board of Officers of URSI. He has also received several awards for his published papers.

Dr. Felsen is a member of the National Academy of Engineering and

a member and former chairman of US Commission VI of the International Union of Radio Science (URSI); he is currently Vice-Chairman of URSI International Commission B, and a member of Eta Kappa Nu, Tau Beta Pi, and Sigma Xi. He is listed in Outstanding American Educators and in other biographical volumes. He is a former Associate Editor of *Radio Science*.

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**Masahiro Geshiro** (S'75) was born in Osaka, Japan, on August 28, 1949. He received the B.E. and M.E. degrees in electrical communication engineering from Osaka University, Osaka, Japan, in 1973 and 1975, respectively. Presently, he is working for the Ph.D. degree at the graduate school of Osaka University, studying in the areas of integrated and light transmission optics.

Mr. Geshiro is a member of the Institute of Electronics and Communication Engineers of Japan.

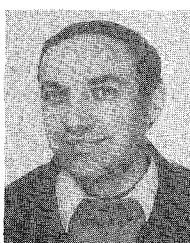
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**Lance A. Glasser** was born in Brooklyn, NY, on September 30, 1952. He received the B.S. degree in electrical engineering from the University of Massachusetts, Amherst, in 1974, and the S.M. degree in electrical engineering from the Massachusetts Institute of Technology, Cambridge, in 1976, where he is presently pursuing a Ph.D. in electrical engineering under a Research Laboratory of Electronics Industrial Fellowship. His research interests include microwave circuits, semi-conductor lasers, and solid-state devices.

He has worked summers at General Electric Company, Teradyne, and in 1977, for MIT Lincoln Laboratories.

\*



**Jean-Louis Guiraud** was born in France in 1943. He received his Maîtrise of applied mathematics in 1968, and Doctorat de 3ème cycle in mathematical physics in 1972.

He was a teacher at secondary school before joining the Université Paul Sabatier, where he is currently Maitre-Assistant and member of a group working on electromagnetic wave theory.

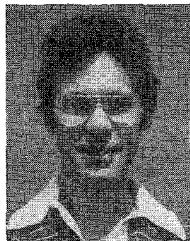
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**Hermann A. Haus** (F'61) was born in Ljubljana, Yugoslavia, in 1925. He received the B.S. degree from Union College, Schenectady, NY, in 1949, the M.S. degree from Rensselaer Polytechnic Institute in 1951, and the Sc.D. degree from Massachusetts Institute of Technology in 1954.

He joined the Faculty of Electrical Engineering at MIT, where he is engaged in research in electromagnetic theory and lasers at the Research Laboratory of Electronics. He was a Guggenheim Fellow from 1959 to 1960 and a Visiting MacKay Professor at the University of California, Berkeley, in the summer of 1968. He is the author of three books and over 100 journal articles.

Dr. Haus is a member of Sigma Xi, Eta Kappa Nu, Tau Beta Pi, the American Physical Society, and the National Academy of Engineering. He is Elihu Thomson Professor of Electrical Engineering.



**Daniel N. Held** (M'68) was born in New York, NY, on April 12, 1947. He received the B.S., M.S., and Sc.D. degrees from Columbia University in 1968, 1971, and 1977, respectively.

From 1968 to 1971 he was employed by the Bendix Corporation's Navigation and Control Division, where his responsibilities included electro-optics and star tracker system design. From 1971 to 1973 he was with the Columbia Astrophysics Lab where he was involved in nuclear electronics and satellite system design. In 1973, he joined the Goddard Institute for Space Studies where he initially supervised the design, development, and implementation of a millimeter-wave radio telescope. Subsequently, he became involved in a research program to identify the source of noise in millimeter-wave mixers. He is currently a Senior Engineer at the NASA Jet Propulsion Laboratory, where he is involved in the design of millimeter-wave radiometers and microwave synthetic aperture radars.

\*



**Joseph Helszajn** (M'64) was born in Brussels, Belgium, in 1934. He received the Full Technological Certificate of the City and Guilds of London Institute from Northern Polytechnic, London, England, in 1955, the M.S.E.E. degree from the University of Santa Clara, Santa Clara, CA, in 1964, and the Ph.D. degree from the University of Leeds, Leeds, England, in 1969.

He has held a number of positions in the microwave industry. From 1964 to 1966 he was Product Line Manager at Microwave Associates, Inc., Burlington, MA. Currently, he is working as a consultant. He is also a Senior Research Fellow at Heriot-Watt University, Edinburgh, Scotland. He is the author of the books *Principles of Microwave Ferrite Engineering* (NY: Wiley) and *Nonreciprocal Microwave Junctions and Circulators* (NY: Wiley, 1975).

Dr. Helszajn is a fellow of the Institution of Electronic and Radio Engineers (England). In 1968 he was awarded the Insignia Award of the City and Guilds of London Institute.

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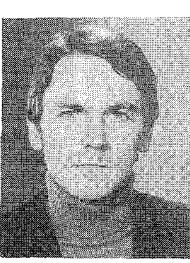


**David S. James** (M'71) was born in Bradford-on-Avon, England, on January 24, 1945. He received the B.Sc. and Ph.D. degrees in electronics engineering from the University College of North Wales, Bangor, UK.

From 1970 to 1977 he was employed by the Department of Communications, Communications Research Centre, Ottawa, Ont., Canada. He is now with Ferranti Ltd., Manchester, UK. His work involves the development of passive and solid-state microwave circuits, especially low-noise satellite subsystems.

Dr. James was Chairman of the Ottawa X-MTT Chapter and is a member of the A.V.S. and the IEE (UK).

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**Rolf H. Jansen** (M'75) was born in Cologne, Germany, on June 24, 1946. He received the Dipl.-Ing. degree in electrical engineering in 1972 and the Dr.-Ing. degree in 1975, both from the Technical University of Aachen, Aachen, Germany.

He worked on numerical methods for the solution of electromagnetic boundary value problems and microstrip techniques. Current research also includes computer aided microwave circuit design and microwave transistor amplifiers. Since 1976, he has been Senior Assistant in the Department of High Frequency Techniques, Technical University of Aachen.

Dr. Jansen is a member of VDE/NTG.



**Garbo Jeng** was born in China on June 10, 1949. She received the B.Sc. degree (with honors) in electrical engineering from the University of Singapore, Singapore, in 1969. She received the M.Sc. and Ph.D. degrees from the University of Manitoba, Winnipeg, Man., Canada.

From 1969 to 1970, she was with the Exchange Planning Section, the Singapore Telephone Board. Her research interests are in the areas of optimization techniques applied to power system load flow studies and development of digital-computing techniques for the solution of boundary-value problems.

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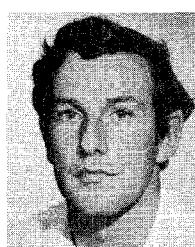


**Masanori Matsuura** was born in Fukui, Japan, on February 14, 1941. He received the B.E. degree in electrical engineering from Fukui University, Fukui, Japan, in 1963, and the M.E. and Ph.D. degrees in electrical communication engineering from Osaka University, Osaka, Japan, in 1965 and 1968, respectively.

He was a Research Associate from 1968 to 1972, and since 1972 he has been an Associate Professor of Communication Engineering at Osaka University. Also, he was a Research Fellow at the Communication Research Center, the Department of Communications, Ottawa, Canada, from 1973 to 1975. He is engaged in studies of optical transmission lines and optical integrated circuits.

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

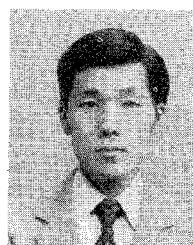
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**Anthony R. Kerr** (S'64-A'66) was born in England on August 30, 1941. He received the B.E., M.Eng.Sc., and Ph.D. degrees from the University of Melbourne, Australia, in 1964, 1967, and 1969, respectively.

In 1969 he joined the Commonwealth Scientific and Industrial Research Organization, Sydney, Australia, to develop low-noise receivers for radio astronomy. From 1971 to 1974 he worked on low-noise cryogenic receivers for millimeter-wave astronomy with the National Radio Astronomy Observatory, Charlottesville, VA. He is presently with the NASA/Goddard Institute for Space Studies, New York, NY, developing low-noise receivers for millimeter and submillimeter wavelengths.

Dr. Kerr is a member of URSI Commission J and the Astronomical Society of Australia.



**Katsunari Okamoto** was born in Hiroshima City, Japan, on October 19, 1949. He received the B.S., M.S., and Ph.D. degrees in electrical engineering, all from the University of Tokyo, Tokyo, Japan, in 1972, 1974, and 1977, respectively.

At present, he is a Member of the Technical Staff at Ibaraki Electrical Communication Laboratory, Nippon Telegraph and Telephone Public Corporation, and is working on fabrication of optical fibers.

Mr. Okamoto is a member of the Institute of Electronics and Communication Engineers of Japan.

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**Masanori Kobayashi** was born in Niigata, Japan, on June 17, 1947. He received the B.S. and M.S. degrees in electrical engineering, both from the University of Ibaraki, Ibaraki, Japan, in 1970 and 1972, respectively.

His research interests are concerned with Green's function for anisotropic electrostatic field problems and analyses of microstrips and electro-optic light modulators.

Mr. Kobayashi is a member of the Institute of Electrical Engineers of Japan.



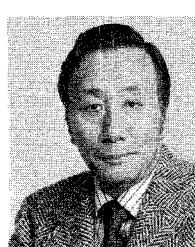
**Takanori Okoshi** (S'56-M'60) was born in Tokyo, Japan, on September 16, 1932. He received the B.S., M.S., and Ph.D. degrees, all from the University of Tokyo, Tokyo, Japan, in 1955, 1957, and 1960, respectively, all in electrical engineering.

In 1960 he was appointed an Instructor, and in 1961, became an Associate Professor in the Department of Electronic Engineering, University of Tokyo, where he worked primarily in the field of microwave circuits, microwave measurements, and microwave electron devices. From 1963

through 1964, on leave of absence from the University of Tokyo, he joined Bell Laboratories, Inc., Murray Hill, NJ, where he was engaged in research on electron guns. In 1972 he joined the Technical University of Munich on a temporary basis as a Guest Professor. In January 1977 he became a Professor at the University of Tokyo. At present, his main fields of interest are microwave planar (two-dimensional) circuits, optical waveguides, holographic memories, and three-dimensional imaging. He has written eight books including one in English entitled *Three-Dimensional Imaging Techniques* (New York: Academic Press, 1976).

Dr. Okoshi is an Associate Editor of the IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES.

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**Nobuaki Kumagai** (M'59-SM'71) was born in Ryojun, Japan, on May 19, 1929. He received the B.Eng. and D.Eng. degrees both from Osaka University, Osaka, Japan, in 1953 and 1959, respectively.

From 1958 to 1960 he was a Visiting Senior Research Fellow at the Electronics Research Laboratory of the University of California, Berkeley, where he was engaged in research on electromagnetic wave scattering and parametric amplifiers. From 1960 to 1970, he was an Associate Professor of Communication Engineering at Osaka University. In

1966, he was invited to the 11th G-MTT International Symposium as an invited speaker. Since 1971, he has been a Professor of Communication Engineering at Osaka University, Osaka, Japan, where he is engaged in research and education in electromagnetic theory, microwave and millimeter-wave engineering, optical waveguides and devices, and lasers and their applications. He is the co-author of *Microwave Circuits* (Tokyo: OHM-sha, 1963) and *Introduction to Relativistic Electromagnetic Field Theory* (Tokyo: Corona Publishing Co., 1971).

Dr. Kumagai is a member of the Institute of Electronics and Communication Engineers of Japan, the Institute of Electrical Engineers of Japan, the Japan Society of Applied Physics, and the Physical Society of Japan.



**Gordon P. Riblet** (M'73) was born in Boston, MA, on December 12, 1943. He received the M.S. and Ph.D. degrees in physics from the University of Pennsylvania, Philadelphia, in 1966 and 1970, respectively.

From 1970 to 1972 he was employed as a Research Scientist at the University of Cologne, Cologne, Germany, performing research in solid-state physics. Since 1972 he has been employed as a Research Scientist at the Microwave Development Laboratories, Natick, MA, working in areas of ferrite devices and computerized test measurements.

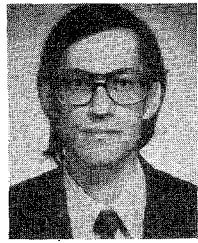


**R. Ruppin** was born in Ramat-Gan, Israel, in 1940. He received the M.Sc. and Ph.D. degrees from the Hebrew University of Jerusalem, Jerusalem, Israel, in 1964 and 1969, respectively.

During 1970 and 1971 he worked as Research Associate at the University of North Carolina, Chapel Hill. Since 1972, he has been a Member of the Theoretical Solid State Physics Group at the Soreq Nuclear Research Centre, Yavne, Israel. Main interests are in surface effects on optical properties of solids.

Dr. Ruppin is a member of the American Physical Society and the Israel Physical Society.

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**Carlos E. Santana** (S'73-M'77) was born in Passa-Quatro, Brazil, on November 26, 1946. He received the B.S. degree in electrical engineering from the Catholic University (PUC), Rio de Janeiro, Brazil, in 1969, the M.S. degree in electrical engineering from the Brazilian Institute for Space Research (INPE), São José dos Campos, Brazil, in 1972, and the Ph.D. degree in electrophysics from the Polytechnic Institute of New York, Brooklyn, NY, in 1976.

From 1970 to 1972 he was a Research Assistant at INPE, working in the development of low-cost microwave antennas for satellite reception. From 1973 to 1976 he was a research fellow at the Polytechnic Institute of New York, studying quasi-optic methods applied to diffraction problems in unstable resonators. He is presently a

Research Associate at INPE's Radiation Group, concerned with propagation and antenna problems.

Dr. Santana is a member of the Brazilian Physical Society and Sigma Xi.

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**Alvin Wexler** (S'56-M'66) was born in Winnipeg, Man., Canada on July 14, 1935. He received the B.Sc. degree in electrical engineering from the University of Manitoba, Winnipeg, Man., Canada, in 1958. He attended Imperial College, London, England, on an Athlone Fellowship and a Metropolitan Vickers Bursary and received the Diploma of Imperial College and the Ph.D. degree from the University of London, London, England.

His research concerned propagation in waveguides loaded with resistive films and ferrites. While in the United Kingdom he was an Assistant Editor of Science Abstracts and later worked for International Computers and Tabulators, Ltd., London, as a Technical Consultant to industry. He returned to the University of Manitoba in August 1966, as a Ford Foundation Fellow and is now a Professor there. His research activities are mainly in the area of the solution of field problems by finite element methods applied to partial differential and integral equation formulations. Very recently he has been involved in the numerical analysis of the propagation of the interface between two regions experiencing phase change, such as can be caused by the diffusion of one material into another or the melting of ice. Also he has joined the editorial boards of the *International Journal for Numerical Methods in Engineering* and *Advances in Water Resources*.

Dr. Wexler is a member of the Association of Professional Engineers of the Province of Manitoba and the Manitoba Research Council. He has served on the S-MTT Technical Committee on Computer-Aided Design of Microwave Circuits, the Editorial Review Board, and the Administrative Committee of the Microwave Theory and Technique Society. He is a Fellow of the Royal Society of Arts.