Guest Editorial

MICROWAVE and millimeter-wave monolithic integrated circuits utilizing grounded and ungrounded coplanar waveguides, along with other planar transmission lines such as microstrip and slot lines, referred to as coplanar MMIC's (CMMIC's), attributed to innovative and high performance with components and subsystems.

The lack of design information on discontinuity structures in coplanar waveguides and interacting structures formed with other planar transmission lines has precluded them from being extensively used in MMIC's. A designer is forced to design circuits using heuristic procedures which neither inspired confidence nor achieve first-pass success.

To overcome this difficulty, we thought it would be prudent to bring this inadequacy to the attention of researchers in the areas of field theory and circuit designs. A workshop in this area could provide in-depth tutorial discussions and the state-of-the-art reviews on theoretical and experimental characterization techniques for discontinuity structures in grounded and ungrounded coplanar waveguides as well as interacting structures formed with other planar transmission lines. The development of analytical models and their integration in the CAD design tools would also be discussed. This will stimulate those uninitiated in the area, and also provide a forum for discussions for those already familiar with it. This would also provide a forum for discussions on current bottleneck issues, possible solutions and future directions on CMMIC's.

In view of these developments and to assess future trends, the Microwave Theory and Techniques Society Technical Committees on Microwave and Millimeter-wave Integrated Circuits (MTT-6) and Microwave Field Theory (MTT-15) jointly sponsored a workshop on "Quasi-planar Millimeter-wave Components and Subsystems," in conjunction with 1990 International Microwave Symposium at Dallas. The workshop program included presentations by seven speakers who provided in-depth reviews of the technical advances made so far, focused on the problems and bottleneck issues in the design of various components using this technology. They also provided a forum for discussions on future directions. The workshop was very well attended and there was considerable audience participation. We wish to again thank those active participants of the workshop who shared their experiences and concerns with the rest of us and endeavored to make the technical exchange very informative.

In keeping with the overwhelming interest of the workshop participants, it was thought that a Special Issue of the MTT TRANSACTIONS would be timely. It would consolidate the research activity in coplanar waveguides. As the industry emphasis is shifting toward dual use and commercial applications, the use of CPW structures is expected to increase dramatically within next several years. The Technical Committees on Microwave and Millimeter-wave Integrated Circuits (MTT-6) and Microwave Field Theory (MTT-15) jointly sponsored this Special Issue of IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES. The objective is to present the background information, current state-of-the-art and future trends in millimeter-wave components and subsystems. The speakers of the workshop were invited to contribute along with open solicitation for this Special Issue.

The response to the Call for Papers was very encouraging. This is evidenced by the number of papers appearing in this issue. The regular length papers of this Special issue have been organized in three major sections. The sections on CPW transmission structures and CPW discontinuity structures contain four papers each. The third section contains one paper on the noise wave transformation for CAD application. There are 24 short papers which cover various aspects of coplanar waveguide technologies.

As the guest editors, we wish to thank Dr. James W. Mink and Dr. James C. Wiltse for their guidance and constant encouragement throughout this endeavor. Also, we wish to express my appreciation to the authors for their efforts. We sincerely thank the reviewers (listed below) for their prompt and careful review of the manuscripts.

Finally, we would like to thank Mr. Daniel Massé and Dr. Steve Maas, present and past editors, respectively, of this TRANSACTIONS for their technical advice and coordination of this issue.

ARVIND K. SHARMA
TATSUO ITOH
Guest Editors

Arvind K. Sharma (S'74–M'78–SM'87) received his B.E. (Hons.) degree in Electronics from Birla Institute of Technology and Science, Pilani, India, in 1973, and the M.Tech degree in Electronics and Communication Engineering, and the Ph.D. degree from the Indian Institute of Technology, Delhi, India, in 1975 and 1981, respectively.

From 1980 to 1982, he was with the Department of Electrical Engineering, University of Ottawa, Ottawa, Canada, as a Research Associate. His areas of interest included microwave and millimeter-wave integrated circuits, and analytical and numerical methods in electromagnetics. From 1982 to 1987, he was with the Microwave Technology Center of RCA Laboratories, David Sarnoff Research Center, Princeton, NJ, as a Member of Technical Staff. He was responsible for the design and development of hybrid and monolithic millimeter-wave integrated circuits, and antennas. He worked on various circuits including IMPATT oscillators and amplifiers,FET amplifiers, phase shifters, harmonic frequency multipliers, and active feed array antennas utilizing microstrip patch antennas as well as integrated fin antennas.

He is now with the RF Product Development Laboratory (RFPDL) in the Electronics and Technology Division of TRW. He is responsible for the characterization and modeling of active devices and passive components at microwave and millimeter-wave frequencies. He is also involved in the design and development of monolithic microwave and millimeter-wave integrated circuits and subsystems including all aspects of their producibility engineering. He has published more than 40 technical papers in the areas of microwaves and millimeter-wave computer-aided design of planar transmission lines and structures. He has received five U.S. patents and has three patents pending. He has also contributed to the *Microwave Solid State Circuit Design* (John Wiley, 1988).

Dr. Sharma is active in the Microwave Theory and Techniques Society. He has served as a chairman of the MTT/ED Chapter of Princeton section in 1983, and as a chairman of the Steering Committee of Sarnoff Symposium in 1985 and 1986. He is a member of the Technical Committee on Microwave Field Theory, the Editorial Board of the IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES, IEEE MICROWAVE AND GUIDED WAVE LETTERS, and the Technical Program Committee for the IEEE International Microwave Symposia since 1985. He has also served as a member of the Technical Program Committee for IEEE International Antenna Symposium in 1985, and as a member of the Steering Committee for the 1987 IEEE International Microwave Symposium. He was a guest editor of the IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES for a special issue on "Quasi-Planar Millimeter-Wave Components and Subsystems," published in February 1989.

Tatsuo Itoh (S'69–M'69–SM'74–F'92) received the Ph.D. Degree in Electrical Engineering from the University of Illinois, Urbana in 1969.

From September 1966 to April 1976, he was with the Electrical Engineering Department, University of Illinois. From April 1976 to August 1977, he was a Senior Research Engineer in the Radio Physics Laboratory, SRI International, Menlo Park, CA. From August 1977 to June 1978, he was an Associate Professor at the University of Kentucky, Lexington. In July 1978, he joined the faculty at the University of Texas at Austin, where he became a Professor of Electrical Engineering in 1981 and Director of the Electrical Engineering Research Laboratory in 1984. During the summer of 1979, he was a guest researcher at AEG-Telefunken, Ulm, West Germany. In September 1983, he was selected to hold the Hayden Head Centennial Professorship of Engineering at The University of Texas. In September 1984, he was appointed Associate Chairman for Research and Planning of the Electrical and Computer Engineering Department at The University of Texas. In January 1991, he joined the University of California, Los Angeles as Professor of Electrical Engineering and holder of the TRW Endowed Chair in Microwave and Millimeter Wave Electronics.

Dr. Itoh is a member of the Institute of Electronics and Communication Engineers of Japan, Sigma Xi, and Commissions B and D of USNC/URSI. He served as the Editor of IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES for 1983–1985. He serves on the Administrative Committee of the IEEE Microwave Theory and Techniques Society. He was Vice President of the Microwave Theory and Techniques Society in 1989 and President in 1990. He is the Editor-in-Chief of IEEE MICROWAVE AND GUIDED WAVE LETTERS. He was the Chairman of USNC/URSI Commission D from 1988 to 1990 and is the Vice Chairman of Commission D of the International URSI.