# The 1998 IMS Technical Program

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## I. Introduction

THE 1998 IEEE International Microwave Symposium (IMS) was a huge success. We had a record attendance with 2306 attending the IMS sessions in Baltimore, MD, the week of June 7–12, 1998. The workshops were very popular, as proven by a record attendance of 3136. The feedback from attendees was excellent and included: quality of technical program, great papers, spacious meeting rooms, and ideal location. Our theme, "Progress Through Microwaves," reflected past accomplishments as well as the explosive expansion of communications through RF wireless technology.

The 1998 Technical Program presented to the attendees the latest technology and advancements in the field. We had 732 papers submitted from 36 countries around the world. The 240 members of the technical program committee (TPC) accepted 431 papers in 29 technical areas for 53 technical sessions. The overall acceptance rate of papers was 59%. 297 papers were presented in five parallel sessions from 8:00 A.M. to 5:10 P.M. Tuesday, Wednesday, and Thursday, while 134 papers were presented at the interactive forum on Wednesday and Thursday afternoon from 2:30 to 5 P.M. We had plenty of room in the spacious newly expanded Baltimore Convention Center for all events. Each one of the five parallel session rooms held over 500 people. The interactive forum was held in the spacious Camden Lobby. There was plenty of open space both inside and outside, with tables and chairs for people to meet outside the technical sessions rooms.

Selected papers from both the Radio Frequency Integrated Circuits (RFIC) Symposium and IMS were featured Tuesday in the area of wireless technology in six joint sessions. These sessions were held to encourage new RF design engineers to attend IMS 98. We also had two joint sessions with the Automatic RF Techniques Group (ARFTG) on Thursday.

Six focused sessions were well attended and highlighted emerging technologies. These focused sessions included: UHF–VHF Power Amplifiers, Microwave and Wireless Education in a Rapidly Changing Environment, Optical Beam-Forming for Phased Arrays, RF and Microwave Implications of Digital TV Broadcasting: European, U.S., Japanese Standards, and Historical Perspectives on Microwave Systems.

Six luncheon panel sessions held Monday to Thursday presented recent advancements in the field. They included: Levels of Integration for RFIC's? The One-Chip Radio ... Realistic Goal or Utter Nonsense, Key Policy Issues in Microwave Spectrum Management, Research Directions in Microwave CAD, Microelectromechanical Systems (MEMS) for Microwave and Millimeter-Wave Applications, Reliability Without Hermeticity, and Advanced Multifunction Systems.

Workshops complemented the technical sessions and were very popular. The 24 workshops held Sunday, Monday, and Friday presented latest technologies. All attendees were provided with published notes of the presenters. The workshop provided a forum for a combination of tutorials as well as the latest techniques in selected areas. Speakers, in addition to presenting their work, also participated in question-and-answer sessions, which provided attendee–speaker interaction. This year's workshops' topics are listed below.

- Wireless Local Loop Systems: Technologies, Opportunities, and Market.
- Low Cost Si-based Technology for Wireless Applications.
- Comparison of the Various MCM Technologies for Microwave Multichip Assemblies.
- Computer-Aided Design, Electromagnetic Modeling, and Measurement for Electronics Packaging and Interconnects.
- Microwave/Lightwave Methods for Indoor and Outdoor Wireless and Mobile Communications.
- Low-Cost Digital and Analog Optoelectronic Modules: Manufacturing and Systems Insertion.
- Advances in Amplifier Linearization.
- Multilayer Microwave Circuits.
- Accurate Characterization of PWB Substrates.
- Cryogenics: A New Beginning.
- Integration of Ferrites into Future Radar, Wireless and Space Systems.
- Analog to Digital Converters for Digital Receiver Systems.
- Technologies for Tunable Microwave Systems.
- IMT-2000: What Is It and What Is in It for the Microwave Community?
- Designing RF Receivers for Wireless Systems.
- High-Frequency Silicon Micromachining and Multi-Chip Integration.
- The Emergence of Millimeter-Wave Video-on-Demand Systems.
- Computer-Aided Design Design for Manufacturability.
- Comparative Filter Technologies for Communications Systems.
- High-Power MMIC Amplifier.
- New Developments in Time-Domain Methods for Nonlinear Design.
- Novel Approaches to Photonic-Antenna Integration.
- Product Development Through Foundaries.
- Antenna Technology for Personal Wireless Communications.

Publisher Item Identifier S 0018-9480(98)09222-9.

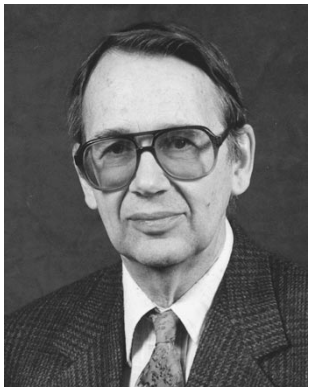
The students were active in IMS 98 and submitted 116 (99 IMS + 17 RFIC) papers for the Student Paper Contest. Of the submitted papers, 71 papers were accepted by the TPC (62 IMS and 9 RFIC). Students of accepted papers presented their papers at their normal sessions. TPC down selected 71 of these accepted papers to 29 for the Student Paper Competition. These were presented at the student interactive forum on Tuesday afternoon from 2:00 to 5:00 P.M. and Wednesday morning from 8:00 to 10:00 A.M. Attendees and judges attended these sessions. The judges selected the winners, which were announced at the Awards Banquet on Wednesday evening. National Science Foundation (NSF) provided up to $10 000 for travel assistance for finalists. Prizes were awarded to the winners, which included: two first place (tie), certificate and $500; second place (two), certificate and $300; third place (four), certificate and $200; Judges' Award (4) $50. All winners were awarded Hewlett-Packard (HP) scientific calculators. Thanks to NSF for providing travel assistance and to HP for donating the calculators.

The 240 members of the TPC and the 23 members from the '98 IMS local Steering Committee Technical Group worked diligently in organizing a premier technical program. We would like to acknowledge their excellent work and thank the following local IMS Technical Committee listed: B. Moore and M. Frankel—Focused Sessions, S. Bajpai and S. Dalal—Panel Sessions, L. Phelps, T. Lee, J. Pond, and P. Stenger—Workshops; H. Newman, D. Buck, and L. Dickens—Interactive Forum, R. Meixner and J. Cruz—Digest Editor, E. Funk—CD ROM, G. Wilkins, P. Herczfeld, R. Hooker, and M. Axler—Student Papers, K. Zaki—University Liaison, R. Westgate and R. Gupta—Transactions Guest Editors.

**Edward C. Niehenke** (S'61–M'61–SM'82–F'89) was born in Abington, PA, in 1937. He received the B.S., M.S., and Ph.D. degrees in electrical engineering from Drexel University, Philadelphia, PA, in 1961, 1965, and 1997, respectively.

From 1961 to 1963, he was with Martin Marietta, where he developed microwave transitions for superconducting delay lines and investigated behavior of semiconductor devices at 77 K. From 1963 to 1997, he was with Westinghouse/Northrop Grumman, Baltimore, MD, where he was responsible for the development of state-of-the-art microwave/millimeter-wave circuits, miniature integrated assemblies, and subsystems. He pioneered the development of super-low-noise microwave circuits, including parametric amplifiers, FET amplifiers, and oscillators [voltage-controlled oscillators (VCO's) and dielectric resonator oscillators (DRO's)] for high-stability airborne systems. He innovated fast-acting high-power microstrip p-i-n limiter circuits and linear analog phase shifters, and conceived unique internally matched subharmonic suppression circuits for bipolar transistors under collector modulation. He innovated and led the development of a miniature 94-GHz transceiver, which included a pHEMT solid-state 1-W transmitter and a monopulse receiver complete with patch antennas, low-noise amplifiers (LNA's), downconverter, and IF receiver. His innovations can be found in over 13 Westinghouse/Northrop Grumman operational production systems. He currently consults and lectures on nonlinear circuit design. He was on the faculty of the Johns Hopkins University, teaching electricity and magnetism for three years in the evening school. He has authored numerous papers on microwave circuits, and developed a nonlinear circuit-design course which he presents throughout the world. He also holds nine patents.

Dr. Niehenke is a Registered Professional Engineer in the State of Maryland. He was a member of IEEE Microwave Theory and Techniques Society (MTT-S) Administrative Committee (ADCom) for nine years, and was the 1986/1987 distinguished microwave lecturer. He is a member of the Microwave and Millimeter Wave Integrated Circuits, Microwave Systems, and Wireless Communications Technical MTT-S Technical Committees. Since 1983, he has served as a member of the MTT-S Technical Program Committee and is the MTT-S ombudsman. His past IEEE service includes MTT-S Membership Services chairman, Finance Committee, and Nominations Committee chairman, 1998 International Microwave Symposium Technical Program chairman, 1986 International Microwave Symposium chairman, Standard Committee member (P457 standard published), Baltimore Section director, and facilities chairman, secretary/treasurer, and chapter chairman of the Baltimore AP/MTT Chapter (named Best Chapter in 1980). He was awarded three Westinghouse Trade Secret Awards, one Westinghouse Value Engineering Merit Award, one George Westinghouse Innovation Award, and the IEEE Centennial Medal. He has given numerous presentations at symposia, workshops, and keynote addresses at conferences.



**Denis C. Webb** (M'62–SM'95–F'98) received the B.S.E. degree in engineering physics and the M.S. degree in physics in 1961 from the University of Michigan at Ann Arbor in 1960 and 1961, respectively, and the Ph.D. degree in applied physics from Stanford University, Stanford, CA, in 1971.

From 1961 to 1966, he was an Engineer with the Westinghouse Electric Corporation, Baltimore, MD, where he investigated ferrite devices for delay, amplification, and frequency conversion of microwave signals. In 1966, he joined the Hansen Microwave Laboratory, Stanford University, as a graduate student and Research Assistant. His thesis research entailed development of a scanning acoustical microscope based upon photoconductive piezoelectric transducers. In 1971, he worked at the Physical Electronics Laboratory, Menlo Park, CA, where he developed YIG-tuned filters and oscillators. In 1972, he joined the Naval Research Laboratory (NRL), Washington, DC. At NRL, he performed individual research and developed contractual programs on analog signal-processing using surface acoustic wave (SAW) and magnetostatic wave devices. He later extended his work to encompass active and passive microwave technology, specializing in the development of control components. In 1987, he became Head of the Microwave Technology Branch, a position which he currently holds. In this capacity, he manages a broadly based R&D program on microwave solid-state materials, devices, components, and circuits for DoD applications. He is also a principal Navy participant in the formulation, monitoring, and assessment of Navy Exploratory Development Programs and DARPA microwave solid-state initiatives.

Dr. Webb has been a member of the Technical Program Committee of the IEEE MTT International Symposium since 1986. From 1994 to 1996, he served on the ADCom of the IEEE MTT Society. He is currently a member of the Technical Group on Microwave Ferrites (MTT-13). He was vice-technical chairman of the 1998 International Microwave Symposium, Baltimore, MD.