# **Authors**

### Manuel Alfonseca

IBM Spain, Madrid Scientific Center

Dr. Alfonseca joined IBM at the Madrid Scientific Center in 1972, where he is a scientific advisor. During this time, he has also been assistant professor of electronic instrumentation and computer science at the University of Madrid. His technical interests are compilation, data base design, and analog simulation. Previously, he worked at the Computer Center of the University of Madrid from 1970 to 1972. Dr. Alfonseca received electronics engineering and doctoral degrees from the Politechnical University of Madrid in 1970 and 1971 and the computer science licenciature in 1972. He is a member of the Association of Telecommunications Engineers of Spain and was awarded the National Graduation Award in 1971.

## Brian T. Bennett

Research Division, Yorktown Heights, New York

Dr. Bennett is a member of the computer sciences department at the Thomas J. Watson Research Center. His work interests include computer system modeling, storage management algorithms, and memory hierarchy analysis. Before joining IBM in 1969, he received a B.Sc. and a Ph.D. in mathematics from Adelaide University, South Australia, in 1964 and 1968. Dr. Bennett is a member of the Association for Computing Machinery and the Operations Research Society of America.

# A. Eugene Blakeslee

Research Division, Yorktown Heights, New York

Dr. Blakeslee has been a member of the crystal synthesis group at the Thomas J. Watson Research Center since 1966. His previous assignments, since joining IBM in 1962, were in the Components Division and with the World Trade Corporation in Boeblingen, Germany. His research has centered around the vapor growth of semiconductor crystals and the characterization and application of these crystals to electronic devices. At present his special interests lie in the area of solar cell materials. Dr. Blakeslee earned his Ph.D. from Cornell University, Ithaca, New York, in 1955 and holds a B.S. in chemistry from Pennsylvania State University, University Park. He is a member of the Electrochemical Society and Sigma Xi.

#### Ted F. Ciszek

System Products Division, East Fishkill, New York

Mr. Ciszek joined IBM in 1972 as a crystal growth consultant. Since 1975, he has helped to introduce and guide silicon crystal growth projects, studied methods for ribbon growth, and conducted crystal defect studies. Prior to joining IBM, Mr. Ciszek worked on various silicon growth techniques at Dow Corning Corporation, Hemlock, Michigan. He obtained his B.S. in 1964 from Case Institute of Technology, Cleveland, Ohio and his M.S. (physics) in 1966 from Iowa State University, Ames. He is a member of the American Association for Crystal Growth, the American Physical Society, Sigma Xi, and Tau Beta Pi.

#### Jerome J. Cuomo

Research Division, Yorktown Heights, New York

Mr. Cuomo received the B.S. degree in chemistry from Manhattan College in 1958 and the M.S. degree in physical chemistry from St. John's University, Jamaica, New York, in 1960, where he also served as a teaching assistant. He joined the IBM Research Division in 1963 and is presently manager of a materials area at the Thomas J. Watson Research Center. His interests are in processes for materials preparation, which include sputter deposition, chemical vapor deposition, and electrodeposition. Some particular interests are in epitaxy, stoichiometric compound formation, and in the preparation of materials in their metatastable states. Mr. Cuomo received an IBM Outstanding Invention Award in 1972 for his work in the area of amorphous magnetic bubble material. He is a senior member of the American Vacuum Society and also a member of Sigma Xi.

### Thomas H. DiStefano

Research Division, Yorktown Heights, New York

Dr. DiStefano is on the technical planning staff at the Thomas J. Watson Research Center, where he joined IBM in 1970. Dr. DiStefano received a B.S.E.E. degree with highest honors from Lehigh University, Bethlehem, Pennsylvania, in 1964 and an M.S.E.E. and Ph.D. in applied physics from Stanford University in 1965 and 1970. From 1964 to 1966 he held a National Science Foundation graduate fellowship and was a member of the research staff at Stanford Linear Accelerator Center, Stanford University from 1969 to 1970. During this same period he was a consultant to Synvar, Inc., Palo Alto, California. Dr. DiStefano is a member of the American Association for the Advancement of Science, the American Physical Society, and the Institute for Electrical and Electronics Engineers.

# Peter A. Franaszek

Research Division, Yorktown Heights, New York

Dr. Franaszek is a member of the computer sciences department at the Thomas J. Watson Research Center. His interests include analytical problems associated with storage hierarchies, magnetic recording, and digital communications. He received the B.S. degree from Brown University, Providence, Rhode Island, in 1962, and the M.S. and Ph.D. degrees from Princeton University.

sity in 1964 and 1965. During the academic year 1973 to 1974, he was on sabbatical leave at Stanford University as a Consulting Associate Professor of Electrical Engineering and Computer Science. Prior to joining IBM in 1968, he was a member of the technical staff at Bell Telephone Laboratories. Dr. Franaszek is a member of Sigma Xi, Tau Beta Pi, and the Institute for Electrical and Electronics Engineers.

# W. Neville Holmes

IBM Australia, Canberra

Mr. Holmes joined IBM in 1959 after graduating from Melbourne University in electrical engineering. He spent many years as a field systems engineer followed by a two year assignment in Poughkeepsie, New York. Mr. Holmes was a permanent staff member of IBM's Systems Development Institute in Canberra during the six years of its existence, working mainly on the use of computers in education. He is now a senior systems engineer in the Canberra branch office.

# Steve A. Jurovics

Data Processing Division, Los Angeles, California

Since 1976, Dr. Jurovics has been a staff member at the Los Angeles Scientific Center, where his interests include mathematical modeling of heat transfer processes in buildings and optimization techniques. He received the B.S. and M.S. degrees in engineering mechanics from Columbia University, New York, and the Ph.D. in engineering in 1969 from the University of Southern California, Los Angeles. Before joining IBM, he was with North American Aviation, Inc., where he worked primarily on trajectory optimization problems applied to the Saturn and Apollo projects. He joined the IBM Federal Systems Division in 1964, where his principal work was on real-time pattern recognition.

# Toyohisa Kaneko

Federal Systems Division, Houston, Texas

Dr. Kaneko began his IBM career in the Research Division at the Thomas J. Watson Research Center, Yorktown Heights, New York in 1970, where he worked on image processing, digital processing, and storage hierarchies. In 1974 he moved to the Federal Systems Division and has since been involved in the computer processing of remotely sensed data, automatic image quality assessment, color film generation, and multi-crop classification. Dr. Kaneko received his B.E. and M.E. degrees in electrical engineering from the University of Tokyo, Japan, in 1962 and 1964, and his Ph.D. in the same area from Princeton University in 1970. He is a member of the Institute of Electrical and Electronics Engineers and the Institute of Electronics and Communications Engineers in Japan.

### Alexander Kran

System Products Division, East Fishkill, New York

Prior to joining IBM in 1962, Mr. Kran was a technical marketing and applications engineer at Westinghouse Electric Corporation, Pittsburgh, Pennsylvania. His past assignments with IBM have been related to the assessment of divisional R&D programs in microelectronics and to improved control of manpower resources. Since 1972, Mr. Kran has been involved in defining the technical and economic potential of silicon technology for large scale photovoltaic solar energy conversion applications. He received a B.S.E.E. in 1957 from Tufts University, Medford, Massachusetts, and an M.B.A. in 1961 from the American International College, Springfield, Massachusetts.

#### Sanford J. Lewis

General Products Division, San Jose, California

Dr. Lewis is an advisory engineer in a magnetic bubble materials process physics group. His current interests are in process control, automation, and analysis and bubble device materials characterization. Prior to joining the bubbles program, he had worked on preparation, development, and characterization of thin film magnetic recording media. He received B.S. degrees in metallurgical and chemical engineering from the University of Michigan in 1965, an M.S. in metallurgical engineering in 1967 and a Ph.D. in metallurgy and materials science in 1970, both from Carnegie-Mellon University, Pittsburgh, Pennsylvania. Dr. Lewis spent a year (1968) at the Ecole Nationale de la Metallurgie et de l'Industrie des Mines at Nancy, France, helping to set up a Mossbauer effect laboratory. Dr. Lewis is a member of the Institute for Electrical and Electronics Engineers, Sigma Xi, and Tau Beta Pi.

# Vingie Y. Merritt

Corporate Headquarters, Armonk, New York

Mrs. Merritt first joined IBM in 1970 at the Thomas J. Watson Research Center, Yorktown Heights, New York, where she worked on the preparation of new materials via photochemical routes and on the study of photochemical mechanisms. In 1974 she transferred to an organic solid state group, where her research included the preparation and study of new organic materials with interesting solid state properties and the development of solid state devices based on these materials. She has authored a book chapter on organic photovoltaic principles. Mrs. Merritt is now an assistant editor of the IBM Journal of Research and Development. She studied chemical engineering at Cornell University, Ithaca, New York, from 1962 to 1964, and received the B.S. in chemistry from Columbia University, New York, in 1967, and the M.S. in organic photochemistry from New York University in 1969. Mrs. Merritt is a member of the American Chemical Society.

# G. David Pettit

Research Division, Yorktown Heights, New York

Mr. Pettit is in a semiconductor science and technology department at the Thomas J. Watson Research Center. He is currently involved with research on the optical properties of solar energy materials. He joined IBM in 1956 at the research laboratory in

439

Poughkeepsie, New York, and has been involved with the physics, spectroscopic and optical properties of phosphor materials, semiconducting materials, light emitting diodes, and semiconducting lasers. He spent a sabbatical year in 1973 at the General Products Division laboratory in San Jose, California, investigating magnetic bubble materials. Mr. Pettit received an A.A.S. degree from Long Island Agricultural and Technical Institute in New York.

# Guenter H. Schwuttke

System Products Division, East Fishkill, New York

Dr. Schwuttke joined IBM in 1962 and has worked in and managed development groups dealing with semiconductor materials research and processing and with solid state physics. His specific interests include radiation damage, ion implantation, and crystal growth. Dr. Schwuttke is currently manager of an advanced silicon materials technology development group. He received his Ph.D. magna cum laude in physics from the University of Munich, Germany, in 1952. He has also served as a consultant to the National Materials Advisory Board and to various United States governmental agencies.

### Maria L. Tavera

IBM Spain, Madrid Scientific Center

Miss Tavera joined IBM at the Madrid Scientific Center in 1974, where she is a member of a computer science department. Her technical interests are compilation, data bases, and logical design. She previously worked for ITTLS in the fields of digital computer design and computer-controlled digital exchanges. Miss Tavera received an industrial engineering degree from the Polytechnical University of Madrid in 1968 and an M.S. in computing science from the University of London, England, in 1973. She is a member of the Imperial College of London and of the Colegio Oficial de Ingenieros Industriales of Madrid. Miss Tavera was awarded the "Pilar Careaga" prize of the Civil Engineering in Spain.

# Stanley M. Vernon

Research Division, Yorktown Heights, New York

Mr. Vernon has been a member of an electro-optical semiconductor device studies group at the Thomas J. Watson Research Center since joining IBM in 1976. His interests include crystal growth of group III-V compounds and solar cells. He received an M.S. degree in electrical engineering from Rutgers University, New Brunswick, New Jersey, in 1976, and a B.S. degree in physics from Boston College. Mr. Vernon is a member of the American Physical Society and Sigma Xi.

### Colin H. West

Research Division, Zurich, Switzerland

Dr. West joined IBM in 1971 at the Zurich laboratory and has worked on laboratory automation, computer graphics, communications, and computer networks. He is currently working on the further development of communications protocol validation. He received a B.S. degree in physics from Imperial College, London, in 1960, and a Ph.D. in elementary particle physics in 1965, also from Imperial College. From 1961 to 1966 he was a Visiting Scientist at the European Organization for Nuclear Research (CERN) in Geneva, Switzerland, and subsequently held post-doctoral positions in the physics department and in the Moore School of Electrical Engineering of the University of Pennsylvania, Philadelphia. Dr. West is a member of the American Physical Society. He has recently received an IBM Outstanding Innovation Award for his work on the automated validation of communications protocols.

# Jerry M. Woodall

Research Division, Yorktown Heights, New York

Mr. Woodall manages an electro-optical semiconductor devices group at the Thomas J. Watson Research Center. His work has included fabrication of GaAs/Si infrared emitting diodes, as well as research on high efficiency GaAlAs-GaAs solar cells and on photothermal conversion devices. He has received three IBM Outstanding Contribution Awards in 1969, 1970, and 1972 for his work in related areas. Mr. Woodall received his B.S. in metallurgy from the Massachusetts Institute of Technology in 1960, and joined the Research Division in 1962. Prior to this, he was associated with the Clevite Corporation. He is a member of the American Physical Society and the Electrochemical Society.

# Kuei H. Yang

System Products Division, East Fishkill, New York

Dr. Yang joined IBM in 1967 and until 1972 worked on chemomechanical techniques for polishing silicon wafers. He has since been using transmission and scanning electron microscopy, as well as x-ray topography, for the characterization of materials and the investigation of defects. He earned his degrees in chemical engineering: the B.S. from Tunghai University, Taiwan, in 1963, the M.S. from the University of Missouri, Rolla, in 1967, and the Ph.D. from Washington University, St. Louis, Missouri, in 1972. Dr. Yang is a member of the Electrochemical Society.

# Contents of previous issues

March 1978		Vol. 22, No. 2	
Novel Materials and Devices for Sunlight Concentrating Systems H. J. Hovel	112	Convex Cubic Splines  B. Dimsdale	168
Solar Radiative Heating in the Presence of Aerosols P. Halpern and K. L. Coulson	122	Steady Axisymmetric Solutions for Pressurized Rotating Flexible Disk Packs D. B. Bogy and F. E. Talke	179
Computation of Convolutions and Discrete Fourier Transforms by Polynomial Transforms <i>H. J. Nussbaumer and P. Quandalle</i>	134	Effect of Replacement Algorithms on a Paged Buffer Database System E. B. Fernández, T. Lang, and C. Wood	185
Language Facilities for Programming User-Computer Dialogues  J. M. Lafuente and D. Gries	145	Communication	
Variational Principles for Semiconductor Device Modeling with Finite Elements J. H. Hohl	159	Model for Database Reference Strings Based on Behavior of Reference Clusters  M. C. Easton	197

May 1978		Vol. 22, No. 3	
Preface	212	Sputter Profiling Through Ni/Fe Interfaces by Auger Electron Spectroscopy	
Model Study in Chemisorption: Molecular Orbital		T. J. Chuang and K. Wandelt	277
Cluster Theory for Atomic Hydrogen on Be(0001)  C. W. Bauschlicher, Jr., P. S. Bagus, and  H. F. Schaefer III	213	Characterization of Electron Traps in Aluminum-Implanted SiO <sub>2</sub> D. R. Young, D. J. DiMaria, W. R. Hunter, and	
Core-Level Photoemission and LEED Studies of		C. M. Serrano	285
Adsorption at Fe Surfaces: Comparison Between CO and O <sub>2</sub> C. R. Brundle	235	Location of Trapped Charge in Aluminum- Implanted SiO <sub>2</sub> D. J. DiMaria, D. R. Young, W. R. Hunter, and C. M. Serrano	289
Reaction of Atomic Hydrogen with Si(111)		C. M. Serrano	205
Surfaces: Formation of Monohydride and Trihydride Phases K. C. Pandey	250	X-Ray Photoelectron Spectroscopy of SiO <sub>2</sub> -Si Interfacial Regions: Ultrathin Oxide Films S. I. Raider and R. Flitsch	294
Chemisorption of Ethane on W(111)  H. F. Winters	260	Electronic Properties of (100) Surfaces of GaSB and InAs and Their Alloys with GaAs  R. Ludeke	304
Molecular Geometries of Acetylene and Ethylene Chemisorbed on Cu, Ni, Pd, and Pt Surfaces J. E. Demuth	265	Oriented Epitaxial Films of (NMP) (TCNQ) E. E. Simonyi, J. F. Graczyk, and J. B. Torrance	315