

Authors

Peter A. Engel

System Products Division, Endicott, New York

Dr. Engel is in a mechanics and metallurgy department at the Endicott laboratory. He joined IBM in 1968 after receiving his Ph.D. in theoretical and applied mechanics from Cornell University, Ithaca, New York. He received a B.E. from Vanderbilt University, Nashville, Tennessee, in 1958 and an M.S. from Lehigh University, Bethlehem, Pennsylvania in 1960, both in civil engineering. At IBM, his work has included investigations of mechanical response and failure, with emphasis on dynamic contact phenomena, impact and wear. Prior to joining IBM, he worked as a structural analyst with Praeger-Kavanagh-Waterbury in New York City from 1959 to 1962, and as a structures research engineer on the Saturn booster project with the Boeing Company in New Orleans, Louisiana, from 1962 to 1965. Dr. Engel is the author of *Impact Wear of Materials*. He is an adjunct staff member at the State University of New York at Binghamton. He is a member of the American Society of Mechanical Engineers.

David B. Bogy

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Dr. Bogy is a Professor of Applied Mechanics at Berkeley and since 1972 has been a consultant to the applied technology group at the IBM Research laboratory in San Jose. His current technical interests include work in anisotropic elastic composites and various types of contact problems on elastic media. He received a B.A. in geology and mechanical engineering and an M.S. in mechanical engineering in 1959 and 1961, both from Rice University, Houston, Texas, and a Ph.D. in applied mathematics in 1966 from Brown University, Providence, Rhode Island. After postdoctoral work in elasticity at the California Institute of Technology, he joined the faculty of the University of California at Berkeley in 1967. Dr. Bogy is a member of the American Society of Mechanical Engineers and Sigma Xi.

Jacob E. Fromm

Research Division, San Jose, California

Mr. Fromm is with a dynamic modeling group at the Research laboratory in San Jose. He joined IBM in 1966. His education includes a B.S. from the University of Colorado, Boulder, in 1953 and an M.S. from the University of California at Los Angeles in 1955, both in physics. His graduate studies were supported by a Hughes Fellowship and his early work dealt with electromagnetic waves. From 1956 to 1966 he was a member of the staff at Los Alamos Scientific Laboratory where his pioneering research on numerical hydrodynamics and computer graphics began. Mr. Fromm is a member of Sigma Pi Sigma and Sigma Tau.

Nur Bugdayci

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Mr. Bugdayci is a graduate student doing research work for a doctorate in elastic wave interaction with piezoelectric transducers. He received his M.S. in mechanical engineering from the University of California, Berkeley, in 1978 and his B.S. in engineering from Swarthmore College, Pennsylvania, in 1975. Mr. Bugdayci is a member of Sigma Xi and Tau Beta Pi.

J. K. Hassan

Data Systems Division, East Fishkill, New York

Mr. Hassan is presently manager of lithography systems and technology tools at the East Fishkill laboratory. He is responsible for directing development of e-beam lithography tools, materials and processes, as well as tool technology in areas such as ion implantation, reactive ion etching, and automated assembly/packaging processes. He joined IBM's Data Systems Division in 1968 at the East Fishkill laboratory. Mr. Hassan received his B.S. in mechanical engineering in 1962 from the University of Kerala, India, and an M.S. in material science and engineering in 1968 from the University of Bridgeport, Connecticut. He holds eight U.S. patents and has received two IBM Outstanding Innovation Awards and two Invention Achievement Awards. Mr. Hassan has authored several papers in the lithography and semiconductor tool technology fields.

William D. Clark

Office Products Division, Boulder, Colorado

Mr. Clark joined IBM's Office Products Division in 1973 at Boulder. He is currently a project engineer working on paper handling in the Boulder laboratory. Mr. Clark received his B.S. in mechanical engineering from Norwich University in Northfield, Vermont, in 1971 and his M.S. in mechanical engineering from Georgia Institute of Technology, Atlanta, in 1973.

Edward F. Helinski

System Products Division, Endicott, New York

Mr. Helinski is in a printer technology area at Endicott. Since joining IBM in 1963, he has worked on pneumatic logic technology and ink jet printers. He received his A.S. in mechanical engineering from Pennsylvania State University, University Park.

Ho Chong Lee

System Products Division, Endicott, New York

Dr. Lee is a senior engineer in a printer technology group in the Endicott laboratory. He has been engaged in the development of printer components, for impact and non-impact printers, since he joined IBM in 1968. He was an Assistant Professor of Mechanical Engineering at Rensselaer Polytechnic Institute, Troy, New York, from 1962 to 1968, during which time he was also retained as a consultant by Mechanical Technology, Inc., Latham, New York (1962-1965) and by the General Electric Company, Schenectady, New York (1965-1968). His education includes a B.S. in mechanical engineering from the University of Bridgeport, Connecticut, 1957; an M.M.E. in 1959; and a Ph.D. in 1962, both from Rensselaer Polytechnic Institute. Dr. Lee is a member of the American Society of Mechanical Engineers.

John C. Marinace

Research Division, Yorktown Heights, New York

Mr. Marinace is in an exploratory semiconductor device group at the Thomas J. Watson Research Center where, at present, he is studying vapor-phase epitaxy of compound semiconductors. He received a B.S. in physics from the University of Denver, Colorado, in 1949. Before joining IBM in 1956 at the Research laboratory in Poughkeepsie, New York, he worked at the General Electric Company in Schenectady and Syracuse, New York, on semiconductor materials. Mr. Marinace is a member of the American Physical Society and the Electrochemical Society.

Johann H. Meier

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Dr. Meier was a senior engineer at the terminal printer technology group at Endicott, New York, prior to his retirement. He was involved in the development of both impact and non-impact print mechanisms. He received his M.S. in civil engineering from the Swiss Federal Institute of Technology in 1936 and a Sc.D. degree from the Massachusetts Institute of Technology, Cambridge, in 1939. From 1939 to 1956 he was with Bucyrus-Erie Co., South Milwaukee, Wisconsin, where he was in charge of research. In 1957 he joined General Electric Company, Schenectady, New York, holding positions as section manager and consulting engineer. After joining IBM in 1961 he received five levels of invention awards and an IBM Outstanding Invention Award. He is past president, honorary member, and Fellow of the Society for Experimental Stress Analysis, and a member of the American Society of Mechanical Engineers and Sigma Chi. In addition to publishing numerous journal papers, Dr. Meier has written the chapter on strain rosettes in the *Handbook of Experimental Stress Analysis*.

John A. Paivanas

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Dr. Paivanas is an advisory engineer in fluid mechanics, heat transfer, and mechanical technology at the Data Systems Divi-

sion development laboratory in East Fishkill. His academic background includes a B.S. and an M.S. in mechanical engineering from the University of Buffalo, New York, and a Ph.D. in engineering mechanics from the State University of New York at Buffalo. Prior to joining IBM in 1968, he was employed from 1955 to 1968 by the Union Carbide Corporation, where he was engaged in research and development in cryogenics, high vacuum technology, and aerothermodynamics. He holds patents in the areas of cryogenic processes and fluid mechanics equipment. At the University of Buffalo, he served as a research associate and as an instructor in fluid mechanics. Dr. Paivanas is a member of the American Association for the Advancement of Science, the American Institute of Aeronautics and Astronautics, the American Society of Mechanical Engineers, and Sigma Xi.

Kurt E. Petersen

Research Division, San Jose, California

Dr. Petersen joined the IBM Research Division in 1975. Since early 1976, he has been involved in the development of micro-mechanical fabrication techniques and the application of those techniques to a wide variety of mechanical devices and components made with silicon. He received his B.S. in electrical engineering in 1970 from the University of California, Berkeley and his Ph.D., also in electrical engineering, in 1975 from the Massachusetts Institute of Technology, Cambridge, where he worked on amorphous semiconductor devices. Dr. Petersen is a member of the American Physical Society and the Institute of Electrical and Electronics Engineers.

J. W. Raider

Office Products Division, Lexington, Kentucky

Mr. Raider is a senior engineer in typewriter development at Lexington. He joined IBM in 1959 at Owego, New York, working in an advanced development group, and between 1966 and 1976, worked in printer development at the Endicott, New York laboratory. His work has been in the fields of automatic control, hydraulics, vibrations, and high-speed mechanisms. He received B.S. and M.S. degrees in mechanical engineering from Purdue University, Lafayette, Indiana, in 1957 and 1959, specializing in automatic control. Mr. Raider is a member of the American Society of Mechanical Engineers and Tau Beta Pi. He has been issued several patents, receiving three IBM Invention Achievement Awards and an IBM Outstanding Invention Award.

Frank E. Talke

Research Division, San Jose, California

Dr. Talke joined IBM in 1969 at the San Jose Research laboratory and is currently manager of a device mechanics group in the applied science complex in San Jose. Prior to his present involvement in ink jet technology, he studied the mechanical aspects of magnetic recording technology. He attended the University of Stuttgart, Germany, where he received a Diplom-Ingenieur degree (M.S.) in mechanical engineering in 1965, and the University of California at Berkeley, where he received a Ph.D. in mechanical engineering in 1968.

Russell H. Taylor

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After receiving a B.E.S. degree from Johns Hopkins University, Baltimore, Maryland, in 1970, Dr. Taylor pursued postgraduate study in computer science at Stanford University, where he received a Ph.D. in 1976. While at Stanford, he was associated with the Stanford Artificial Intelligence Laboratory. In addition to his dissertation work on automatic generation of manipulator programs, he was a co-designer and implementor of an advanced function manipulator system there, and for several years had principal responsibility for development and maintenance of SAIL, an ALGOL-level artificial intelligence language. In 1976 he became a research staff member in a computer sciences department at the IBM Thomas J. Watson Research Center, Yorktown Heights, New York, and in 1978 joined an advanced manufacturing systems group at Boca Raton. His current research in-

terests include computer controlled manipulators, programming languages, and artificial intelligence.

Jack L. Zable

System Products Division, Endicott, New York

Dr. Zable joined IBM in 1964 and is a development engineer in an impact printer technology area. He received a B.M.E. degree in 1963 from the City College of New York, an M.S.M.E. degree in 1965 from Purdue University, Lafayette, Indiana, and a Ph.D. degree in mechanical engineering from Purdue University in 1969, studying under an IBM Resident Study Graduate Fellowship. Since rejoining IBM he has been involved in the dynamic analysis of mechanical systems, and in the design and development of ink jet components. Since 1976 he has been involved with the design and development of impact printers.