



AUTHORS — OCTOBER 1982

FUSION REACTORS

STUDIES OF THE PHYSICS AND ENGINEERING OF DEUTERIUM-DEUTERIUM BARRIER TANDEM MIRROR REACTORS

R. W. Conn (front row, middle) (PhD, California Institute of Technology, 1968) is currently a professor of engineering and applied science at the University of California-Los Angeles (UCLA). **V. K. Dhir** (not pictured) (PhD, Kentucky University, 1972) is currently a professor of engineering and applied science at UCLA. **N. M. Ghoniem** (front row, right) (PhD, University of Wisconsin, 1977) is currently an associate professor of engineering and applied science at UCLA. **D. M. Goebel** (back row, second from left) (PhD, UCLA, 1981) is currently an associate development engineer in the Fusion Engineering and Physics Program at UCLA and a technical staff member in the Energy Technology Division at TRW, Inc. **S. P. Grotz** (back row, far right) (BS, University of Wisconsin, 1979) is an assistant development engineer in the Fusion Engineering and Physics Program at UCLA. **F. Kantrowitz** (back row, far left) is currently working on his PhD at UCLA. **N. S. Kim** (back row, second from right) (PhD, Brown University, 1978) is an assistant research engineer in the Fusion Engineering and Physics Program at UCLA. **T. K. Mau** (not pictured) (PhD, University of Wisconsin, 1977) is an assistant research engineer in the Fusion Engineering and Physics Program at UCLA. **G. W. Shuy** (not pictured) (PhD, University of Wisconsin, 1980) is an assistant research engineer in the Fusion Engineering and Physics Program at UCLA. **M. Z. Youssef** (front row, left) (PhD, University of Wisconsin, 1980) is an assistant research engineer in the Fusion Engineering and Physics Program at UCLA.

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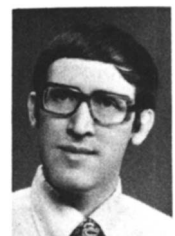


PLASMA ENGINEERING

PARTIALLY CATALYZED DEUTERIUM AND TRITIUM-ASSISTED PLASMA CHARACTERISTICS

Ehud Greenspan (right) (BSc, mechanical engineering, Technion; PhD, nuclear science and engineering, Cornell University) was a visiting professor in the Nuclear Engineering Program of the University of Illinois from 1979 to 1981, on leave from the Nuclear Research Center and the Ben-Gurion University of the Negev, Israel. He held visiting appointments at the Princeton

Ehud Greenspan
George H. Miley



Plasma Physics Laboratory and Oak Ridge National Laboratory. His professional interests include the conception and analysis of novel fusion and fission energy systems, transport processes in fission and fusion reactors, reactor physics, and methods development. **George H. Miley** (right) (PhD, University of Michigan, 1958) is professor and chairman of the Nuclear Engineering Program at the University of Illinois in Urbana-Champaign. In addition to research on fusion, he is well known for his research on energy conversion and nuclear-pumped lasers.



BURN CONTROL IN A MOVING RING COMPACT TORUS REACTOR

Masami Ohnishi

Masami Ohnishi (Dr. Eng., electrical engineering, Kyoto University, Japan, 1979) is a research associate at the Institute of Atomic Energy, Kyoto University. He was a visiting assistant professor in the Nuclear Engineering Program of the University of Illinois from April 1979 for six months and held a visiting appointment at Lawrence Livermore National Laboratory from October 1979 to April 1980. His current interests include alpha-particle transport in magnetic fusion, dynamics and control of fusion reactors, and reactor design studies of open-ended systems.



ELECTROMAGNETIC INDUCTION PHENOMENA IN PLASMA SYSTEMS

Béla Karlovitz

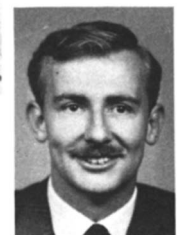
Béla Karlovitz (picture not available) (degree, mechanical engineering, Technical University, Budapest, 1926; degree, electrical engineering, Swiss Federal Institute of Technology, Zürich, 1928) was employed from 1928 to 1938 by the Electric Public Utility of the City of Budapest. During this period, he developed in collaboration with Dr. Dénes Halász the principles of magnetohydrodynamic (MHD) power generation; from 1938 until 1947 conducted experimental research on MHD at the Westinghouse Research Laboratories in Pittsburgh; and from 1947 until 1953 studied turbulent flames at the U.S. Bureau of Mines in Pittsburgh. As a member of Combustion & Explosives Research, Inc. since 1953, he is active as a consultant on fundamental combustion problems.

PLASMA HEATING SYSTEMS

ELECTRON CYCLOTRON HEATING IN WEAKLY RELATIVISTIC FINITE-BETA TANDEM MIRROR PLASMAS

*Karl R. Audenaerde
John E. Scharer*

Karl R. Audenaerde (top) (MSc, electrical engineering, Eindhoven, The Netherlands, 1972; PhD, physics, Utrecht, The Netherlands, 1976) is a lecturer in the Department of Electrical and Computer Engineering and an assistant scientist in the Nuclear Engineering Department at the University of Wisconsin (UW) in Madison. He joined the UW in 1975 after working on electron cyclotron emission from thermonuclear plasmas at the Comitato Nazionale per l'Energie Nucleare center in Frascati, Italy. His main interests are wave phenomena in plasmas, numerical analysis, the fine arts, and the teaching of electromechanical field theory. **John E. Scharer** (BS, 1961, MS, 1963, and PhD, 1966, electrical engineering, University of California, Berkeley) is a professor and associate



chairman of electrical and computer engineering at UW. He joined the faculty in 1966 and has conducted theoretical, experimental, and reactor design research on plasma wave coupling, propagation, and heating.

BURNOUT EXPERIMENT IN SUBCOOLED FORCED-CONVECTION BOILING OF WATER FOR BEAM DUMPS OF A HIGH POWER NEUTRAL BEAM INJECTOR

Hiroshi Horiike (top) (PhD, nuclear engineering, Osaka University) is a research scientist in the Division of Thermonuclear Fusion Research at Japan Atomic Energy Research Institute (JAERI). He has worked mainly in the development of ion source and neutral beam injector for magnetically confined plasmas (JT-60 tokamak). **Masaaki Kuriyama** (center) (PhD, mechanical engineering, Tokyo Institute of Technology) is a research scientist in the Division of Thermonuclear Fusion Research at JAERI. He has worked in the development and construction of the neutral beam injection systems for JT-60 tokamak. **Hiroaki Morita** (bottom) (MS, mechanical engineering, Kyoto University) was a research scientist in the Division of Thermonuclear Fusion Research at JAERI from 1977 to 1979 on leave from Mitsubishi Heavy Ind. Ltd. He is now a technical staff member of the nuclear fusion group at Mitsubishi Heavy Ind. Ltd.

*Hiroshi Horiike
Masaaki Kuriyama
Hiroaki Morita*



BLANKET ENGINEERING

IMPACT OF CROSS-SECTION UNCERTAINTIES ON THE NUCLEAR DESIGN OF HYBRID REACTORS

Mahmoud Z. Youssef (top) [PhD, nuclear engineering, University of Wisconsin (UW), 1980] is currently a member of the research staff in the Fusion Engineering and Physics Program at the University of California at Los Angeles (UCLA). He spent one year at the Casaccia Nuclear Study Center in Italy. His research interests include pure fusion and hybrid engineering, technology, radioactivity and safety analysis, sensitivity and perturbation theory, and neutronics methods for fusion and fission reactors. **Robert W. Conn** (center) (PhD, California Institute of Technology, 1968) spent one year at the Joint Euratom Nuclear Research Center at Ispra, Italy, and a year at the Brookhaven National Laboratory before joining the UW in 1970. While at UW, he served as a professor of nuclear engineering and as director of the Fusion Engineering Program. Since 1980, he has been a member of the UCLA faculty as a professor of engineering and applied science. His primary research interests include fusion reactor physics and technology, plasma physics, neutron transport and nuclear reactor physics, reactor plasma analysis, and surface physics. **Charles W. Maynard** (bottom) (BS, electrical engineering, University of Maryland; PhD, applied physics, Harvard University, 1957) has worked at Bettis Atomic Power Laboratory, operated by Westinghouse Electric Company, in the Reactor Theory and Methods Section. He was appointed associate professor of nuclear engineering at the UW in 1961 and became a professor in 1965. His research interests include neutronics analysis and design of fission and fusion reactors.

*Mahmoud Z. Youssef
Robert W. Conn
Charles W. Maynard*



NEUTRONIC, PHOTONIC, AND THERMAL CALCULATIONS RELEVANT TO A MAJOR PLASMA DISRUPTION IN A CANISTER-TYPE TOKAMAK BLANKET

Ronald J. Onega (top) (PhD, Pennsylvania State University, 1964) is an associate professor of mechanical and nuclear engineering at the Virginia Polytechnic Institute and State University (VPI&SU). He has worked in the areas of fission and fusion energy and studied the thermal effects of major plasma disruptions in tokamaks during the summers of 1978 and 1979 at Oak Ridge National Laboratory. Currently his research interests are in sensitivity theory and heat and mass transport in porous media. **Bill M. Su** (MS, nuclear engineering, University of Virginia, 1977; PhD, nuclear engineering, VPI&SU, 1981) is presently an engineer at Stone & Webster Engineering Corporation in Boston and is studying the Mark II suppression pool swelling problem, including wake effect after a postulated loss-of-coolant accident.

*Ronald J. Onega
Bill M. Su*



CYCLIC TEMPERATURE AND THERMAL STRESS FLUCTUATIONS IN FUSION REACTORS

Ihor O. Bohachevsky (top) (BAE magna cum laude, New York University, 1956; PhD, applied mathematics, New York University, 1961) is a staff member in the Analysis and Assessment Division of the Los Alamos National Laboratory. His current work is in the area of inertial confinement fusion systems and applications studies with particular emphasis on the identification and solution of technical problems associated with the utilization of fusion energy. His previous work in the areas of fluid mechanics, numerical analysis, magnetohydrodynamics, and mathematical modeling was carried out at Cornell Aeronautical Lab, Buffalo, New York; Avco-Everett Research Lab, Everett, Massachusetts; and Bell Telephone Lab, Murray Hill, New Jersey. **Ronald N. Kostoff** (BSME, Drexel University, 1961; PhD, aerospace and mechanical sciences, Princeton University, 1967) is a physical scientist in the Office of Energy Research, U.S. Department of Energy (DOE). From 1966 to 1975, he was employed by Bell Telephone Labs, where he performed technical studies in support of National Aeronautics and Space Administration Headquarters, and economic studies in support of AT&T Headquarters. From 1975 until the present, he has been employed at DOE where he has managed the Nuclear Applied Technology Development Division, the Magnetic Fusion Systems Studies Program, and the Advanced Technology Program. While at DOE, he has authored over 20 papers on fusion power and advanced fissile fuel breeders.

*Ihor O. Bohachevsky
Ronald N. Kostoff*

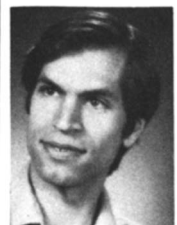


EXPERIMENTAL DEVICES

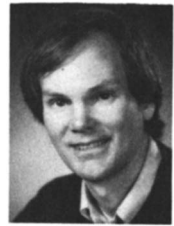
NEUTRAL XENON BEAM FOR PLASMA DIAGNOSTICS

Ady I. Hershcovitch (top) [ScD, applied plasma physics, Massachusetts Institute of Technology (MIT), 1977] has worked on the Versator II tokamak at MIT and on the RENTOR tokamak at Rensselaer Polytechnic Institute. He is currently a member of the Neutral Beam Development Group at Brookhaven National Laboratory (BNL) and an adjunct professor of nuclear engineering at the Polytechnic Institute of New York. **George M. Gammel** (bottom) (PhD, applied plasma physics, Cornell University, 1979)

*Ady I. Hershcovitch
George M. Gammel
James W. Davenport*



has conducted experimental research on collective ion acceleration by a high power electron beam, and on a new type of low-beta, multichannel Linac. Currently an associate scientist with the BNL Neutral Beam Development Group, he is studying options for H⁻ acceleration. **James W. Davenport** (right) (PhD, physics, University of Pennsylvania, 1976) is an associate physicist at BNL. He has worked mainly on solid surfaces including photoemission intensities and optical properties of adsorbed layers.



ICF TARGETS

A PHENOMENOLOGICAL DESCRIPTION OF RAYLEIGH-TAYLOR AND HELMHOLTZ INSTABILITIES IN SMALL FUSION TARGETS

Ronald C. Kirkpatrick

Ronald C. Kirkpatrick (BS, electrical engineering, 1959, and MS, physics, 1963, Texas A&M University; PhD, astronomy, University of Texas at Austin, 1969) has worked as a research engineer at the National Aeronautics and Space Administration's (NASA's) Ames Research Center, the Southwest Research Institute, and NASA Goddard Space Flight Center. He was an assistant professor at Texas A&M University before becoming a staff member at Los Alamos National Laboratory.



FIRST-WALL TECHNOLOGY

THE DESIGN OF THE POLOIDAL DIVERTOR EXPERIMENT TOKAMAK WALL ARMOR AND INNER LIMITER SYSTEM

*H. W. Kugel
M. Ulrickson*

H. W. Kugel (top) (PhD, nuclear physics, University of Notre Dame, 1967) is a research physicist at the Princeton Plasma Physics Laboratory (PPPL) where he coordinates poloidal divertor experiment neutral beam operations. His current research interests include optimizing neutral beam heating performance and the development of neutral beam diagnostics. **M. Ulrickson** (PhD, nuclear physics, Rutgers University, 1975) is a research physicist at PPPL. He is in the Applied Physics Division of the lab and is involved primarily in the physics aspects of the design of limiter and first-wall components for the tokamak fusion test reactor, the fusion engineering device, and the international tokamak reactor. This involves both modeling of the plasma edge and close interaction with the engineers doing the mechanical design.



SAFETY/ENVIRONMENTAL ASPECTS

OCCUPATIONAL RADIATION EXPOSURES AT A FUSION POWER STATION

Clay E. Easterly

Clay E. Easterly (BS, physics, University of Mississippi, 1966; PhD, physics, University of Tennessee, 1972) is a research associate in the Health Effects and Epidemiology Group of the Health and Safety Research Division at Oak Ridge National Laboratory (ORNL). He has worked at ORNL since 1973. Current activities include preparation of a technical basis document for a generic environmental impact statement (GEIS) for magnetic fusion energy and work on that GEIS. He was recently selected to participate in the U.S.-Japan science exchange program on tritium radiobiology and health physics.

