

AUTHORS — NOVEMBER 1984

PLASMA ENGINEERING

ALPHA-DRIVEN CURRENTS IN TOKAMAK REACTORS

Michael J. Gouge (top) (BS, physics, U.S. Naval Academy, 1973; PhD, physics, University of Tennessee, 1984) is a fusion program manager at the U.S. Department of Energy, Oak Ridge Operations Office. From 1974 to 1978 he was a nuclear engineering officer on the U.S. George Bancroft (SSBN-643) and was qualified in submarines and as a naval nuclear engineer. He was a senior reactor inspector with the U.S. Nuclear Regulatory Commission, Atlanta, Georgia, from 1978 to 1980. His current research interests include alpha-particle physics and safety aspects of fusion reactors. **Lee M. Hively** (center) (BS, engineering science, and BS, mathematics, 1970, Pennsylvania State University; MS, physics, 1971, and PhD, nuclear engineering, 1980, University of Illinois) is a fusion plasma physicist employed by General Electric Company at the Fusion Engineering Design Center at Oak Ridge National Laboratory. From 1971 to 1974 he was a member of the research staff at Western Electric Company, Princeton, New Jersey, and later obtained a U.S. patent (#3,944,963) as a result of his work in millimetre waveguide processing. His current research interests include high energy fusion-product transport in tokamaks, bundle divertor optimization, and plasma performance in the Fusion Engineering Device. **Dilip K. Bhadra** (bottom) (BSc, University of Calcutta; PhD, physics, University of California, 1969) is a staff scientist at GA Technologies Inc. (formerly General Atomic Co.). His specialty is the design and implementation of studies in plasma physics, both theoretical and applied. He has had extensive experience in working with aspects of the design of different conceptual reactor-type fusion devices.

*Michael J. Gouge
Lee M. Hively
Dilip K. Bhadra*



THERMONUCLEAR BURNING IN A TOKAMAK PLASMA WITH POLARIZED NUCLEI

*Ya. Kolesnichenko
D. Anderson
M. Lisak*

Biographies and photographs were not available.

**PERFORMANCE ESTIMATES OF PHOTONEUTRALIZED
NEGATIVE-ION BEAMS**

Joel H. Fink

Joel H. Fink (BSEE, 1943, Polytechnic Institute of Brooklyn, 1943; MEE, Cornell University, 1963; PhD, plasma physics, Carnegie-Mellon University, 1969) is currently a consultant on negative ion/neutral beam technology at Lawrence Livermore National Laboratory. He has been involved with neutral beam system development for the past ten years.



NEGATIVE MOLECULAR ION-PARTICLE BEAM SOURCE

M. J. Lavan

M. J. Lavan (BS, Wayne State University; MS and PhD, physics, University of Iowa, 1971) has been a civilian employee of the U.S. Army, first at Rock Island, Illinois, and since 1977, at the Ballistic Missile Defense Advanced Technology Center in Huntsville, Alabama, where he has been responsible for the technical direction of a wide variety of optics programs, ranging from infrared optical sensor technology to high-energy lasers. He is interested in energy technology; however, it is not a part of his Army research activities.



**EFFECTS OF HELIM ON SEPARATION CHARACTERISTICS
OF CRYOGENIC DISTILLATION COLUMN CASCADE FOR
FUSION REACTOR**

Masahiro Kinoshita

**AN EFFICIENT SIMULATION PROCEDURE ESPECIALLY
DEVELOPED FOR HYDROGEN ISOTOPE DISTILLATION
COLUMNS**

Masahiro Kinoshita (MS, chemical engineering, Kyoto University, 1979; PhD, chemical engineering, Kyoto University, 1983) has worked on development of computer-aided simulation procedures and programs for stage processes both in the fuel cycle system for a fusion reactor and in other chemical engineering systems. He has also started preliminary experimental study for cryogenic distillation.



**THE FUSION BREEDER—AN EARLY APPLICATION OF
NUCLEAR FUSION**

*James A. Maniscalco
David H. Berwald
Ralph W. Moir
Joseph D. (J. D.) Lee
Edward Teller*

James A. Maniscalco (right) (PhD, nuclear engineering, Purdue University, 1973) is manager of the fusion business area at TRW, Inc. Research programs in the fusion business area include plasma supplemental heating systems, mirror fusion physics experiments, advanced lasers, reactor engineering, and fusion-fission hybrids. Previously, he was group leader in charge of



system studies for the Laser Fusion Program at Lawrence Livermore National Laboratory (LLNL). He is the author of more than 25 publications in the areas of fusion reactor design, fusion-fission hybrids, and neutronics analysis. **David H. Berwald** (top right) (PhD, nuclear engineering, University of Michigan, 1977) is the technical program manager for fusion-fission hybrids at TRW, Inc. His research interests include nuclear design and shielding analysis, fusion technology, advanced fission reactor fuel cycles, applications of advanced isotope separation technologies, and high-level waste disposal. **Ralph W. Moir** (top left) (ScD, nuclear engineering, Massachusetts Institute of Technology, 1967) worked in 1967 and 1968 on the magnetic fusion project at Fontenay-aux-Roses, France (Centre d'Etude de l'Energie Nucléaire-Commissariat à l'Energie Atomique). In 1968, he joined LLNL, where he has specialized in development of the direct conversion of fusion plasma energy to electrical energy and reactor design. At present, he is head of the fusion-fission hybrid reactor design study project and serves as associate program leader for advanced mirror systems. Moir is registered in the state of California as a professional nuclear engineer. **Joseph D. (J. D.) Lee** (bottom right) (BSEE, electrical engineering, Duke University, 1961; MS, nuclear engineering, University of New Mexico) is a member of the Mirror (Fusion) Reactor Studies staff at LLNL. He started investigating the potential of fusion/fission in 1969 and is one of its principal spokesmen. He joined LLNL full-time in 1966 to work on the SNAP 50 project after working two summers on LLNL's "Fran" and "Super Kukla" prompt burst reactors. He has been involved in LLNL's fusion program since 1968. **Edward Teller** (bottom left) (PhD, University of Leipzig, 1930) has worked as a theoretical physicist in the fields of quantum theory, molecular physics, and astrophysics. He has been a professor of physics at the University of Chicago, assistant director at the Los Alamos National Laboratory, consultant at LLNL, and professor of physics at the University of California. He retired in 1975 and has held the positions of Associate Director Emeritus at LLNL and Senior Research Fellow at the Hoover Institution since then. He has received many honors in his work, among them the Enrico Fermi Medal, the Albert Einstein Award, the Joseph Priestly Award, the Harvey Prize, and the National Medal of Science.



COMMERCIAL TOKAMAK REACTORS WITH RESISTIVE TOROIDAL FIELD MAGNETS

L. Bromberg (top) [SB, electrical engineering, Massachusetts Institute of Technology (MIT); PhD, nuclear engineering, MIT] is currently a research scientist at the Plasma Fusion Center, MIT. His research interests are in the areas of fusion reactor studies. **D. R. Cohn** (center) (AB, physics, University of California at Berkeley; PhD, physics, MIT) is currently head of the fusion systems division and senior research scientist at the Plasma Fusion Center, MIT. His research interests are in the areas of fusion reactor studies, millimetre and submillimetre wave technology, and plasma diagnostics. **D. L. Jassby** (bottom) (BS, physics, McGill University; PhD, astrophysical sciences, Princeton University) served as assistant professor in the University of California, Los Angeles electrical sciences department from 1970 to 1973. He is now a principal research physicist at Princeton Plasma Physics Laboratory. His research activities include the heating of toroidal plasmas, the design of magnetic confinement fusion devices, and the production and application of fusion neutrons.

*L. Bromberg
D. R. Cohn
D. L. Jassby*



SAFETY ASSESSMENT OF THE MARS TANDEM MIRROR REACTOR

Husam Gurol (top) (BS, 1971; MS, 1972; and PhD, 1975, nuclear engineering, University of Michigan) is a senior scientist at Science Applications, Inc. (SA). His research areas include fusion reactor system studies, reactor safety, plasma engineering, and effects of irradiation on materials. **Ali E. Dabiri** (BS, engineering, Teheran Polytechnic, 1967; MS, 1969, and ScD, 1971, engineering, Massachusetts Institute of Technology) is a senior scientist at SA. He has worked on many aspects of fusion engineering issues including first-wall and blanket design of alternative fusion fuel reactors. He is currently involved in compact fusion reactor studies. Past work includes gas/solid interactions, energy conservation, and energy systems.

*Husam Gurol
Ali E. Dabiri*



RADIATION SAFETY CRITERIA FOR MAINTENANCE AND WASTE MANAGEMENT IN THE MIRROR ADVANCED REACTOR STUDY

R. Carroll Maninger (top) (BS, California Institute of Technology, 1941) is a senior staff engineer in the Reactor Technology and Conceptual Design Group of the Magnetic Fusion Energy Program of the Lawrence Livermore National Laboratory (LLNL). His research interests include the generation, processing, and disposal of radioactive materials for both fission and fusion machines. His primary focus is devising methods to facilitate communication among scientists, engineers, and managers on the consequences of material selections with respect to occupational and public health and safety in the overall life cycle of reactors. **David W. Dorn** (PhD, physics, Purdue University) is a member of the Reactor Technology and Conceptual Design Group of the Magnetic Fusion Energy Program at LLNL. His current research includes investigation of activation of materials in the high neutron fluxes associated with operating fusion experiments and projected reactors. His prime concern is developing a data base and an understanding of neutron activation of different structural and component materials that will enable the designers of today's experiments and tomorrow's fusion reactors to choose materials, which, when activated, will have minimal operational and waste disposal problems.

*R. Carroll Maninger
David W. Dorn*



EXPERIMENTAL RESULTS FROM HYDROGEN/DEUTERIUM DISTILLATIONS AT THE TRITIUM SYSTEMS TEST ASSEMBLY

Robert H. Sherman (right) (BS, chemistry, Illinois Institute of Technology, 1951; PhD, chemistry, University of California at Berkeley, 1955) is a physical chemist in the Materials Science and Technology Division of Los Alamos National Laboratory (LANL). He has principal responsibility for the isotope separation and gas analysis systems, and is also collaborating on studies

*Robert H. Sherman
John R. Bartlit
D. Kirk Veirs*



of muon catalyzed deuterium-tritium (D-T) fusion. **John R. Bartlit** (top) (BScE, Purdue University, 1956; DEng, chemical engineering, Yale University, 1963) joined LANL in 1962 and is presently deputy project manager of the tritium systems test assembly. His particular responsibilities lie in fusion fuel processing systems — the D-T fuel cleanup system and the hydrogen isotope separation system. **D. Kirk Veirs** (bottom) (BS, chemistry and environmental science, Northern Arizona University, 1976; PhD, chemistry, Pennsylvania State University, 1981) is a physical chemist in the Chemistry Division of LANL. He is developing spontaneous Raman spectroscopy for on-line, *in situ*, real-time analysis of relative concentrations of molecular hydrogen isotopic species.



A CRYOGENIC DISTILLATION COLUMN CASCADE FOR A FUSION REACTOR

Masahiro Kinoshita (MS, chemical engineering, Kyoto University, 1979; PhD, chemical engineering, Kyoto University, 1983) has worked on development of computer-aided simulation procedures and programs for stage processes both in the fuel cycle system for a fusion reactor and in other chemical engineering systems. He has also started preliminary experimental study for cryogenic distillation.

Masahiro Kinoshita

