

AUTHORS — MARCH 1988

ALPHA-PARTICLE WORKSHOP

INFLUENCE OF FAST ALPHA DIFFUSION AND THERMAL ALPHA BUILDUP ON TOKAMAK REACTOR PERFORMANCE

Nermin A. Uckan (top right) (PhD, nuclear engineering, University of Michigan, 1975) is a staff member in the Fusion Energy Division at Oak Ridge National Laboratory (ORNL) and a professor of nuclear engineering at the University of Tennessee, Knoxville. She has contributed to theory and modeling of bumpy tori and tokamaks in the areas of fusion plasma engineering and fusion reactor design studies. **John S. Tolliver** (top left) (PhD, plasma physics, University of Tennessee, 1984) is a computational plasma physicist in the Computing and Telecommunications Division at ORNL. He has worked on plasma transport theory, particle orbits, and Monte Carlo calculations for bumpy tori, and stellarator and tokamak reactor studies. His current research interest is in ion cyclotron resonance frequency heating calculations. **Wayne A. Houlberg** (bottom right) (PhD, nuclear engineering, University of Wisconsin, 1977) is a staff member in the Fusion Energy Division at ORNL. His primary research interest is in the development of physics and computational models for toroidal plasmas and the extension of these models to reactor conditions. **Stanley E. Attenberger** (bottom left) (PhD, experimental high energy physics, Cornell University, 1974) is a computational plasma physicist in the Computing and Telecommunications Division at ORNL. He has worked on numerical simulations of tokamak plasmas and fusion reactors since 1974. His current research interests include plasma transport, plasma equilibria, and pellet injection in tokamaks and stellarators.

*Nermin A. Uckan
John S. Tolliver
Wayne A. Houlberg
Stanley E. Attenberger*



ALPHA-PARTICLE EFFECTS ON MAGNETOHYDRODYNAMIC STABILITY IN THE ENGINEERING TEST REACTOR TOKAMAK

James W. Van Dam (right) (PhD, physics, University of California at Los Angeles, 1979) is a research scientist and the assistant director of the Institute for Fusion Studies (IFS) at the University of Texas at Austin. His interests include kinetic theory,

*James W. Van Dam
Guo-yong Fu*



magnetohydrodynamics, plasma waves, and equilibrium and stability in toroidal confinement devices. **Guo-yong Fu** (right) (BS, physics, China University of Science and Technology, 1983) is a research assistant and doctoral candidate in the IFS. His thesis work concerns transport limitations on access to ballooning-mode second stability in tokamaks with auxiliary heating, as well as alpha-particle effects on Alfvén waves in ignition plasmas.



MODIFICATION OF TOKAMAK BALLOONING STABILITY BOUNDARIES BY ALPHA POPULATIONS

Donald A. Spong (top) (BS, nuclear engineering, University of Arizona, 1970; PhD, nuclear engineering, University of Michigan, 1976) is a research staff member in the Theory Section of the Fusion Energy Division at Oak Ridge National Laboratory (ORNL). He has been with ORNL about 12 years and has worked in the areas of runaway electron physics in tokamaks, neoclassical transport, and hot electron stability in the Elmo Bumpy Torus device, alpha physics in tokamak reactors, and kinetic effects on toroidal stability. His more recent work has specifically been in the areas of the effects of alpha populations on tokamak ballooning stability and an analysis of neoclassical magnetohydrodynamic (MHD) pressure and current gradient driven instabilities. **D. J. Sigmar** (center) specializes in the theory of magnetically confined tokamak plasmas. His publications range from high- and low-frequency microinstabilities to MHD equilibrium and stability problems to neoclassical impurity transport and alpha-particle dynamics in ignited plasmas. He is adjunct professor of nuclear engineering at the Massachusetts Institute of Technology (MIT) and a research staff member at its Plasma Fusion Center. **J. J. Ramos** (bottom) (PhD, physics, University of Madrid, Spain, 1977) is a research scientist at the Plasma Fusion Center of MIT. He has worked on the MHD theory of tokamak equilibrium and stability and on kinetic instabilities in tokamak plasmas.

*Donald A. Spong
D. J. Sigmar
J. J. Ramos*



HELIUM FLOW REVERSAL WITH NEUTRAL BEAM INJECTION AND ELECTRON CYCLOTRON RESONANCE HEATING IN TIBER-II

M. A. Malik (top left) [MS, nuclear physics, Punjab University, Pakistan; MS, nuclear engineering, Georgia Institute of Technology (GIT)] is a doctoral candidate and a graduate assistant in the Nuclear Engineering Program at GIT. He has taught physics for 11 years. His research interests include computational modeling and impurity transport in tokamaks. **K. Indireskumar** (top right) (BE, mechanical engineering, Bangalore University, India, 1982; ME, mechanical engineering, Indian Institute of Science, India, 1984) is currently working for his PhD at the Fusion Research Center, GIT. **John Mandrekas** (bottom left) (diploma, mechanical and electrical engineering, National Technical University of Athens, Greece, 1979; MS, 1984, and PhD, 1987, nuclear engineering, University of Illinois) is a postdoctoral fellow at the Fusion Research Center, GIT. His current research interests include neutral beam current drive and impurity transport in tokamaks, the modeling of tokamak edge plasmas, and theoretical plasmas physics. **W. M. Stacey, Jr.** (bottom right) (BS, physics, 1959, and MS, nuclear science, 1963, GIT; PhD, nuclear engineering, Massachusetts Institute of Technology, 1966) is Callaway Professor of Nuclear Engineering at GIT and serves as senior U.S. participant to the International Atomic

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Energy Agency International Tokamak Reactor Workshop. **T. W. Ogden** (right) (BA, physics, Wittenberg University, 1977; BS, nuclear engineering, University of Cincinnati, 1981) is currently a graduate student in the Nuclear Engineering/Fusion Program at GIT. His present interests include nuclear particle transport in fission and fusion reactors.



PROBLEMS IN MODELING TOROIDAL FIELD RIPPLE LOSS OF FAST ALPHAS FROM A TOKAMAK REACTOR

Lee M. Hively

Lee M. Hively (BS, engineering science, and BS, mathematics, 1970, Pennsylvania State University; MS, physics, 1971, and PhD, nuclear engineering, 1980, University of Illinois) is a research staff member in the Health and Safety Research Division of Oak Ridge National Laboratory (ORNL). He is responsible for large code development and implementation on the Cray computers. From 1971 to 1974, he was a member of the research staff at the Western Electric Company Engineering Research Center, and later obtained a U.S. patent as a result of his work on millimetre waveguide. He was a plasma systems physicist with General Electric Company at the Fusion Engineering Design Center at ORNL from 1980 to 1984. Since 1986 he has been on temporary assignment to the Office of Fusion Energy at the Germantown headquarters of the U.S. Department of Energy. His research interests include high-energy fusion product transport and plasma performance in tokamaks.



PLASMA OSCILLATION BURSTS AND SCATTERING OF INTERMEDIATE ENERGY ALPHA PARTICLES

*Bruno Coppi
F. Porcelli*

Bruno Coppi (right) (PhD, Politecnico di Milano, Italy, 1959) has been a professor of physics at the Massachusetts Institute of Technology (MIT) since 1968. He has served as director of the International School of Plasma Physics, Varenna, and initiated the theoretical program on the physics of thermonuclear plasmas at MIT. He was the founder and principal investigator of the Alcator Experimental Program on fusion research at MIT. A photograph and biography for **F. Porcelli** were not available at publication time.



FUSION REACTORS

A NOVEL NON-POWER-PRODUCING FUSION-FISSION BREEDER REACTOR

*Kenneth L. Wrisley
Don Steiner*

Kenneth L. Wrisley (top) [MS, nuclear engineering, Rensselaer Polytechnic Institute (RPI), 1986] is a commissioned officer in the U.S. Army and is currently a PhD candidate at RPI. His current interests are in corrosion, aqueous fusion blankets, fission-fusion systems, and fusion blanket design. **Don Steiner** (BS, chemical engineering, 1960; MS, 1962, and PhD, 1967, nuclear engineering, Massachusetts Institute of Technology) is professor of nuclear engineering at RPI. Since 1968 he has been involved



in fusion power systems analysis and design. His current interests include plasma engineering, blanket development, and reactor design.

NONELECTRICAL APPLICATIONS

HELIUM-3 FUNCTIONS IN TOKAMAK-PUMPED LASER SYSTEMS

D. L. Jassby



D. L. Jassby (BS, physics, McGill University, Montreal, Quebec, Canada; PhD, astrophysical sciences, Princeton University) served as assistant professor in the electrical sciences department at the University of California at Los Angeles 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.

DIVERTOR SYSTEMS

FEASIBILITY STUDY FOR AN ENGINEERING CONCEPT OF A STAINLESS STEEL/COPPER DIVERTOR PLATE PROTECTED BY W-5 Re ALLOY OR GRAPHITE ARMOR

*Vito Renda
Gianfranco Federici
Loris Papa*



Vito Renda (right) (degree, nuclear engineering, Politecnico di Torino, Italy, 1971) spent about 10 years at Commissariat à l'Énergie Atomique, Cadarache, France, and at Ansaldo, Genoa, Italy, working on the design and structural analysis of the liquid-metal breeder reactor Superphénix operating at Creys-Malville. He is now head of the structural integrity and safety group at the Commission of European Communities' Joint Research Centre, Ispra, Italy, engaged in a safety project of the fusion technology and safety program. **Gianfranco Federici** (photo not available) (degree, nuclear engineering, Politecnico de Milano, Italy) is working on his master's degree at the University of California at Los Angeles. **Loris Papa** (photo not available), technician.

BLANKET ENGINEERING

ANALYSIS OF ACTIVATION MEASUREMENTS DONE ON SLABS OF BERYLLIUM AND LEAD AT LOTUS FACILITY

*Anil Kumar
Cherif Sahraoui*



Anil Kumar (right) [MS, physics, Agra University, India; PhD, physics (nuclear engineering), University of Bombay, India, 1981] is currently a senior scientist at Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland. Previously, he was a scientific officer at the Bhabha Atomic Research Centre, India, from 1974

to 1981. His main research interests include fusion physics, particle transport, and fusion-fission blanket neutronics. **Cherif Sahraoui** (right) (diploma, physics, EPFL, Switzerland, 1983) is currently working on his doctoral thesis research on neutron multiplication studies on lead and beryllium. He is also developing a deuteron-based minidetector for neutron spectrometry.



PLASMA HEATING SYSTEMS

TEST OF THE POWER-CARRYING CAPABILITY OF WATER-DIELECTRIC-LOADED ION CYCLOTRON HEATING WAVEGUIDE LAUNCHERS

K. G. Moses

K. G. Moses (PhD, physics, Temple University, 1964) is the manager of the Plasma Technology Division at JAYCOR. He has contributed to exploding wire phenomena, diagnostics of confined plasmas, ion and electron cyclotron resonance plasma heating, and intense relativistic electron beams. Moses was a branch chief at Magnetic Fusion Energy/U.S. Department of Energy prior to joining JAYCOR.



MAGNET SYSTEMS

MAGNETIC ALIGNMENT IN THE MIRROR FUSION TEST FACILITY-B TANDEM MIRROR

*E. B. Hooper, Jr.
Richard H. Bulmer
Larry L. Higgins*

E. B. (Bickford) Hooper, Jr. (top) (BS, 1959, and PhD, 1965, physics, Massachusetts Institute of Technology) is a physicist in the Magnetic Fusion Energy (MFE) Division at Lawrence Livermore National Laboratory (LLNL). He is presently working on preparations for the Microwave Tokamak Experiment. He has worked on a variety of topics in plasma physics and magnetic fusion including the experimental plasma physics of tandem mirrors, the physics and design of advanced tandem mirrors, low-frequency instabilities, confinement and heating of toroidal plasmas, diagnostics, and intense negative ion beams. He spent a postdoctoral year at the Royal Institute of Technology (Sweden), has been employed as assistant professor of applied science at Yale University, and has taught graduate physics courses at the University of California, Davis, Livermore Extension. **Richard H. Bulmer** (center) (BS, 1967, and MS, 1968, engineering, University of Missouri at Rolla) is an engineer in the MFE Program at LLNL. He has worked on several fusion energy experimental facilities including Astron, 2XII-B, and the Mirror Fusion Test Facility, in the areas of magnetic field analysis and magnet design. He is presently in the Reactor Studies Group investigating toroidal magnetic configurations for future tokamak experiments. **Larry L. Higgins** (bottom) (PhD, physics, University of California, Berkeley) has been a physicist at TRW, Inc. since 1957. He is presently working on electron accelerators for free electron lasers. He has worked on various topics in plasma physics and magnetic fusion, particularly diagnostics and plasma sources.



CURRENT REQUIREMENTS FOR OHMIC IGNITION IN OHMICALLY HEATED TOROIDAL EXPERIMENT AND REVERSED-FIELD PINCH REACTORS

R. A. Scardovelli (top) (Dottore, nuclear engineering, University of Bologna, Italy, 1981; PhD, nuclear engineering, University of Illinois, 1987) is presently at the Max-Planck-Institut für Plasmaphysik at Garching, Federal Republic of Germany, with a postdoctorate fellowship. **George H. Miley** (PhD, University of Michigan, 1958) is a professor in the Department of Nuclear Engineering at the University of Illinois. In addition to research on fusion, he is well known for his research on energy conversion and nuclear-pumped lasers.

R. A. Scardovelli
George H. Miley

