Fusion technology

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BLANKET ENGINEERING

SUBCOOLED FLOW BOILING CRITICAL HEAT FLUX (CHF) AND ITS APPLICATION TO FUSION ENERGY COMPONENTS. PART I. A REVIEW OF FUNDAMENTALS OF CHF AND RELATED DATA BASE

SUBCOOLED FLOW BOILING CRITICAL HEAT FLUX (CHF) AND ITS APPLICATION TO FUSION ENERGY COMPONENTS. PART II. A REVIEW OF MICROCONVECTIVE, EXPERIMENTAL, AND CORRELATIONAL ASPECTS

Ronald D. Boyd

Ronald D. Boyd (BS, mechanical engineering, Tuskegee Institute, 1968; PhD, mechanical engineering, University of Michigan, 1976) is currently principal investigator for the High Heat Flux Removal Program for Fusion Reactor Components at Sandia National Laboratories. For the last eight years, he has been a principal investigator and heat transfer consultant for the High Heat Flux Materials and Fusion Component Development, the Liquid-Metal Fast Breeder Reactor Spent Fuel Transportation, the Waste Isolation Pilot Plant, and Reactor Safety Programs. From 1968 to 1971 he was a research engineer at the Los Alamos National Laboratory. His interests include theoretical and experimental (including optical) analyses of thermal transport processes.

AN INVESTIGATION OF THE SOLUBILITY OF LiOH IN SOLID Li_2O

M. Tetenbaum
A. K. Fischer
C. E. Johnson

M. Tetenbaum (top) (PhD, physical chemistry, Polytechnic Institute of Brooklyn, 1954) is a chemist at Argonne National Laboratory (ANL). His research interests include investigations of the high-temperature thermodynamic behavior of reactor materials for fission and fusion application. **A. K. Fischer** (bottom) (BA, chemistry, New York University, 1953; MA, 1955,

and PhD, 1958, inorganic chemistry, Harvard University) is a chemist at ANL. He is currently involved with experimental and calculational investigations of breeder/tritium interactions for fusion reactors. **C. E. Johnson** (right) (PhD, chemistry, Michigan State University, 1958) is a senior chemist at ANL and is leader of the fuels and materials section. His research interests include investigations of phase equilibria and thermodynamic properties of fission fuels and fusion breeder blanket materials.

PLASMA ENGINEERING

PLASMA RADIUS CONTROL SYSTEM FOR TANDEM MIRRORS

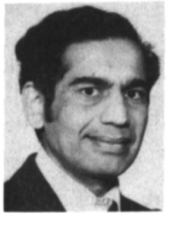
Farrokh Najmabadi
Robert W. Conn

Farrokh Najmabadi (top) (PhD, nuclear engineering, University of California, Berkeley, 1982) is currently a senior development engineer in the Fusion Engineering and Physics Program at the University of California, Los Angeles (UCLA). His primary research interests are applied plasma physics and fusion reactor physics and technology. **Robert W. Conn** (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 University of Wisconsin (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.

FUSION REACTORS

THE INTEGRATED-BLANKET-COIL CONCEPT APPLIED TO THE POLOIDAL FIELD AND BLANKET SYSTEMS OF A TOKAMAK REACTOR

Don Steiner
R. C. Block
B. K. Malaviya



Don Steiner (top) [BS, chemical engineering, 1960; MS, 1962, and PhD, 1967, nuclear engineering, Massachusetts Institute of Technology (MIT)] is professor of nuclear engineering at Rensselaer Polytechnic Institute (RPI). Since 1968 he has been involved in fusion power systems analysis and design. His current interests center around compact reactor design. **R. C. Block** (center) (BS, electrical engineering, Newark College of Engineering, 1950; MS, physics, Columbia University, 1953; PhD, nuclear physics, Duke University, 1956) is professor of nuclear engineering and director, Gaerttner Linac Laboratory, RPI. His research activities include nuclear data, neutron physics, and industrial applications of radiation. **B. K. Malaviya** (bottom) [BSc (Hons.) and MSc, mathematics and physics, Banaras University; AM and PhD, physics, Harvard University, 1964] is professor of nuclear engineering and engineering science at RPI. Prior to joining the RPI faculty, he held research appointments at Brookhaven

National Laboratory and MIT. His current research interests include the areas of fusion reactor materials, plasma/wall interactions, and fusion technology.

PERFORMANCE SCALING OF FUSION REACTORS USING THE DEUTERIUM-TRITIUM AND ADVANCED FUEL CYCLES

J. Reece Roth

J. Reece Roth (SB, physics, Massachusetts Institute of Technology, 1959; PhD, engineering physics, Cornell University, 1963) joined the National Aeronautics and Space Administration (NASA) Lewis Research Center in Cleveland, Ohio, in 1963, where he was principal investigator of the Lewis Electric Field Bumpy Torus Project until 1978. He is presently on the faculty of the electrical engineering department of the University of Tennessee, Knoxville. While at NASA, Roth pioneered in the application of superconducting magnet facilities to high-temperature plasma research. This work included a superconducting magnetic mirror machine, which was put in service in 1964, and the superconducting Bumpy Torus magnet facility, which was put in service in 1972. Roth initiated research on the electric field Bumpy Torus concept, an approach to creating a plasma of fusion interest in which strong radial electric fields are imposed on a Bumpy Torus plasma in such a way that they contribute to the heating, stability, and confinement of the plasma. Among his contributions to the understanding of basic processes in plasmas are his experimental discovery of the continuity-equation oscillation, and of the geometric mean plasma frequency, a new mode of electromagnetic emission from plasmas.

SHIELDING

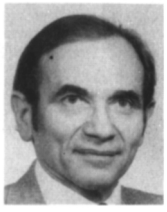
ANALYSIS OF A 14-MeV NEUTRON STREAMING THROUGH A NARROW HOLE DUCT USING THE MONTE CARLO COUPLING TECHNIQUE

Kohtaro Ueki
Yuichi Ogawa
Hiroshi Naito
Tomonori Hyodo

Kohtaro Ueki (top right) (BS, nuclear engineering, Tokai University) has been a senior researcher at the Ship Research Institute since 1976. He has worked mainly in the application and development of the Monte Carlo method for radiation shielding of marine reactors, spent fuel shipping casks, and spent fuel shipping vessels. He is a developer of the Monte Carlo Coupling Technique for neutron streaming in a large shielding system. **Yuichi Ogawa** (top left) (PhD, engineering, University of Tokyo, Japan, 1981) is a research scientist at the Institute of Plasma Physics (IPP), Nagoya University. For three years he has been involved in nuclear radiation analysis and the plasma physics design of the Reacting Plasma Project (R Project). **Hiroshi Naito** (bottom right) (PhD, physics, Nagoya University, 1980) is a researcher at the IPP and belongs to the design team of the R Project. He is interested in the computer simulation of plasma physics. **Tomonori Hyodo** (bottom left) (BS, physics, 1947, and DrEng, nuclear engineering, Kyoto University) has been a professor of nuclear engineering in the Kyoto University Department of Nuclear Engineering since 1966. His research interests include transport of neutron and gamma rays through materials, reactor shielding, neutron- and gamma-ray measurements, and fusion reactor neutronics.

FINITE ELEMENT ANALYSIS OF THE SHOCK WAVES INDUCED IN THE LIQUID WALL OF A PELLET FUSION REACTOR

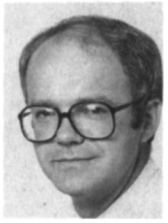
Kenzo Miya
Takayuki Iizuka
Joseph Silverman



Kenzo Miya (top) [PhD, University of Tokyo (UT), 1969] worked at the Products Research and Development Laboratory, Nippon Steel Corporation and has been an associate professor at the Nuclear Engineering Research Laboratory of the UT. He was a visiting associate professor at the University of Maryland's Institute for Physical Science and Technology during 1978. He was also a visiting professor at Cornell University in 1980 and at the University of Tennessee in 1981. He has been a full professor of the UT since 1983. His primary research interests include electromagnetomechanical interaction problems and radiation-induced mechanical vibration in the field of nuclear fusion reactor technology. **Takayuki Iizuka** (center) (PhD, UT, 1984) has been a researcher in the high-temperature engineering department of the Japan Atomic Energy Research Institute since 1984. His primary research interests include problems on fluid mechanics and high-temperature reactor technology. **Joseph Silverman** (bottom) (PhD, Columbia University, 1951) has been a professor of chemical and nuclear engineering at the University of Maryland since 1960. He has also served as director of the university's Institute for Physical Science and Technology during 1976 to 1983. He has been chairman of the American Nuclear Society Isotopes and Radiation Division and received the Society's Radiation Industry Award in 1975. He was a Guggenheim Fellow in 1966. His primary research interests are the effect of ionizing radiation on chemical systems and materials and radiation source technology.

THERMAL ANALYSIS OF THE TOKAMAK FUSION TEST REACTOR VACUUM VESSEL

S. Z. Fixler
G. W. Gilchrist
J. Bialek



S. Z. Fixler (top) (BME, City College of New York, 1955; MME, Polytechnic Institute of New York, 1961) is currently group leader of the Grumman Aerospace Corporation (GAC) team performing thermal and structural analysis on the Tokamak Fusion Test Reactor in association with the Princeton Plasma Physics Laboratory (PPPL). Since 1976 he has been involved in the analysis and design of high heat load components for fusion devices. Prior to that he served as structural mechanics group leader on the F-14 aircraft. **G. W. Gilchrist** (center) (BE, mechanical engineering, State University of New York at Stony Brook, 1981) is a thermal analyst for GAC. His interests include thermal modeling of various components for fusion devices. **J. Bialik** (bottom) (BS, engineering science, State University of New York, 1968; MS, mathematics, 1972, and MS, physics, 1981, Stevens Institute of Technology) is currently lead engineer in the Engineering Analysis Division of the PPPL.

DETERMINATION OF ENERGETIC PARAMETERS OF THE (*d, t*) NEUTRON BEAM OF A NEUTRON GENERATOR

A. Tsechanski
G. Shani

A. Tsechanski (top) (MSc, electrical engineering, Ryazan Institute of Radio Engineering, USSR, 1967; PhD, nuclear engineering, Ben-Gurion University of the Negev, Beer-Sheva, Israel, 1981) is employed by the nuclear engineering department of the Ben-Gurion University of the Negev. His current interests include fast neutron spectra measurements and integral experiments for fusion reactor blanket design. **G. Shani** (BSc, electrical engineering, 1964, and MSc, nuclear science, 1966, Technion, Israel; PhD, nuclear engineering, Cornell University, 1970) is currently associate professor of nuclear engineering at Ben-Gurion University of the Negev. He is engaged in the neutronics and first-wall interaction in fusion reactors. His past activities have been in the fields of neutron physics, experimental reactor physics, application of nuclear radiation, and nuclear instrumentation.

THE ENERGY COST OF NUCLEAR BREEDING

C. W. Gordon
A. A. Harms

C. W. Gordon (top) [BA Sc; engineering science, University of Toronto, 1974; ME, engineering physics, 1976, and PhD, nuclear engineering, 1979, McMaster University (MU)] has been assistant professor (part-time) at MU since 1983 and is employed at Ontario Hydro in the Nuclear Safety Section. His research interests are in the areas of emerging nuclear energy systems and the tritium fuel cycle. **A. A. Harms** (PhD, nuclear engineering, University of Washington, 1969) has been at MU for the past 15 years. His research interests are in the areas of emerging nuclear energy systems (fusion-fission hybrids and symbionts, spallation breeders, muon-catalyzed fusion, fusion chains, etc.), neutron radiography, and the tritium fuel cycle.