

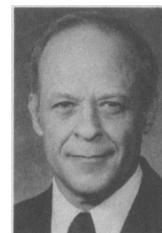
AUTHORS — JANUARY 1990

FISSION REACTORS

REACTIVITY ANOMALIES IN THE FAST FLUX TEST FACILITY—AN EVALUATION OF DATA FROM CYCLES 1 THROUGH 8

Bradley J. Knutson (top) (BS, nuclear engineering, Oregon State University, 1978; MS, nuclear engineering, University of Washington, 1982) is a senior engineer at Westinghouse Hanford Company. He has worked in the area of reactor physics parameter predictions, supporting the operation of the Fast Flux Test Facility (FFTF). He has developed an analysis method for predicting FFTF assembly bowing reactivity effects and a physics test procedure for normal operational and special reactivity feedback testing in the FFTF. He has also monitored subcritical reactivity and rod position during power operation. He is currently responsible for providing calculations of physics data for present and future FFTF core loadings and special test assemblies, and providing technical support for FFTF physics testing. **Richard A. Harris** (BS, engineering physics, University of Kansas, 1960; graduate studies, University of Washington, 1968–1971) worked at Battelle Pacific Northwest Laboratories from 1964 to 1968 where he was responsible for the analysis of solution critical assemblies, weapons support studies, and the analysis and planning of initial zero-power critical assemblies in support of the conceptual design of the FFTF. He has worked at Westinghouse Hanford Company since 1971 on the development of an overall physics test program for normal operational testing in the FFTF. He has also developed techniques for dynamic measurements of reactivity feedbacks, subcritical reactivity monitoring, and rod position monitoring during power operation. He is currently responsible for providing physics data and technical support for normal plant operation and the development, scheduling, and conduct of special physics tests.

*Bradley J. Knutson
Richard A. Harris*



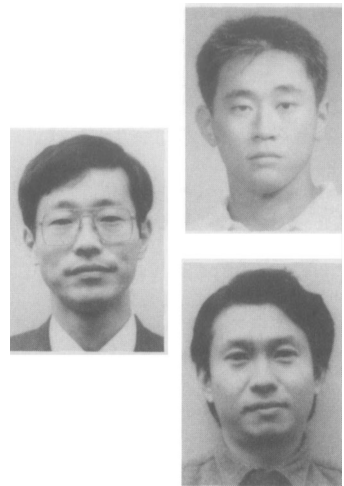
A NEW CONTROL STRATEGY FOR NUCLEAR POWER REACTORS

Hiroaki Wakabayashi (right) (DE, nuclear engineering, University of Tokyo, Japan, 1968) has worked on a lead neutron slowing down time spectrometer, the YAYOI research reactor, and the inherently safe ISER reactor, all at the University of Tokyo Nuclear Engineering Research Laboratory. His current interests

*Hiroaki Wakabayashi
Nobuhiro Nakanishi
Kazunori Sasaki
Morikazu Takegaki*



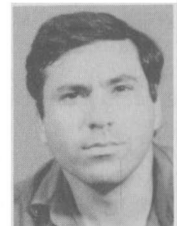
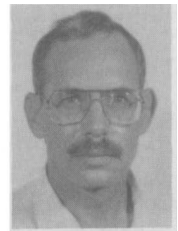
are the technical examination of nuclear power and the establishment of commonly acceptable worldwide use of nuclear power through inherently safe reactors. **Nobuhiro Nakanishi** (top) (BE, nuclear engineering, University of Tokyo, Japan, 1988) worked on the closed-loop automation of pressurized water reactors. He is currently employed at the Hamaoka Nuclear Station. **Kazunori Sasaki** (center) (BS, mechanical engineering, Waseda University, Japan, 1975) is a nuclear engineer at the Mitsubishi Electric Company Central Research Laboratory, where he developed a plant dynamics simulator. His current research interests include parallel processing, operator support systems, and optimal maintenance scheduling. **Morikazu Takegaki** (bottom) (PhD, Osaka University, Japan, 1981) is a systems science researcher at the Mitsubishi Electric Company Central Research Laboratory. His current research interests include advanced control of large-scale plants, application of artificial intelligence and fuzzy theory to plant control, and adaptive systems.



POSSIBILITIES FOR IMPROVEMENTS IN LIQUID-METAL REACTORS USING LIQUID-METAL MAGNETOHYDRO-DYNAMIC ENERGY CONVERSION

Amitzur Z. Barak (top right) (DSc, civil engineering, Israel Institute of Technology, Israel) is a senior staff engineer at the Israel Atomic Energy Commission. He was the technical manager of the Joint U.S.-Israeli Desalination Project. He invented and developed several desalination processes and solar collectors. His current interests are in the development and evaluation of novel energy and desalination systems. **Leif Blumenau** (photo not available) (MS, mechanical engineering, Lund Institute of Technology, Sweden, 1969) is head of SunCool Ltd., devoted to the development of devices based on the Stirling cycle. He was formerly the supervising engineer for tokamak systems for the Tokamak Fusion Test Reactor at the Princeton Plasma Physics Laboratory. He has also been involved in the design of nuclear power plants, magnets, cryostats, and vacuum vessels and structures, as well as the conceptual development of liquid-metal magnetohydrodynamic (LMMHD) energy conversion systems. **H. Branover** (top left) (PhD, technical sciences, Moscow Aviation Institute, USSR, 1962) has been involved with fundamental research on LMMHD flows and the development of concepts using liquid-metal technology and its application to energy conversion. He holds the Lady Davis Chair, professorship of magnetohydrodynamics at the Ben-Gurion University of the Negev (BGU), where he is also head of the Center for MHD Studies. **A. El-Boher** (center right) (MSc, mechanical engineering, BGU, Israel, 1979) has extensive experience with LMMHD energy conversion technology. His particular expertise is in the design of LMMHD channels and integrated LMMHD energy conversion systems. He is currently the Etgar power plant program manager. **Ehud Greenspan** (photo not available) (BSc, mechanical engineering, Israel Institute of Technology; PhD, nuclear science and engineering, Cornell University) is with the Israel Atomic Energy Commission, where his current professional interests include the investigation of improvements in fission and fusion reactors and of promising applications of LMMHD energy conversion technology. **E. Spero** (bottom left) (BSc, mechanical engineering, Case Western Reserve University, 1980) is a research engineer at the BGU Center for MHD Studies. His main professional interests are the analysis and the conceptual development of thermodynamic energy conversion cycles. **S. Sukoriansky** (bottom right) (PhD, mechanical engineering, BGU, Israel, 1987)

*Amitzur Z. Barak
Leif Blumenau
H. Branover
A. El-Boher
Ehud Greenspan
E. Spero
S. Sukoriansky*



specializes in the research and theoretical analysis of turbulent liquid-metal flows in the presence of magnetic fields, and the computer modeling and simulation of energy systems. He is currently on leave at Princeton University.

A LIMIT LINE FOR EARTHQUAKE INTENSITY ATTENUATION

Salvatore Taibi

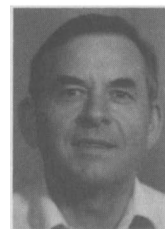


Salvatore Taibi (Dr.Eng., nuclear engineering, University of Palermo, Italy, 1974) is a researcher in the Department of Nuclear Engineering at the University of Palermo. He has mainly worked in the field of nuclear power plant safety and siting. His current interests include environmental aspects of nuclear power, heat and mass transfer in nuclear reactor safety, reliability studies and risk assessment, and computer modeling for accident analysis.

EXPERIMENTAL AND NUMERICAL INVESTIGATIONS OF SODIUM BOILING EXPERIMENTS IN PIN BUNDLE GEOMETRY

*Maurizio Bottoni
Burkhardt Dorr
Christoph Homann
Franz Huber
Karl Mattes
F. W. Pepler
Dankward Struwe*

Maurizio Bottoni (top right) (Dr. Eng., Bologna University, Italy, 1965) has worked at Kernforschungszentrum Karlsruhe (KfK) since 1974. He is currently responsible for the development and verification of computer programs for safety analysis of liquid-metal fast breeder reactors (LMFBRs). **Burkhardt Dorr** (top left) [Dipl.-Phys.-Eng., Physical-Technological Institute, Federal Republic of Germany (FRG), 1966] has been involved in the design and interpretation of sodium boiling experiments in partially blocked LMFBR bundles. **Christoph Homann** (second from top right) (Dr. rer. nat., Hannover University, FRG, 1977) previously worked in the field of plasma physics. He has been involved in the numerical simulation of the thermohydraulic behavior of partially blocked LMFBR subassemblies at KfK since 1978. **Franz Huber** (center left) (BS, mechanical engineering, Fachhochschule Karlsruhe, FRG, 1957) has worked at KfK since 1964 and is responsible for out-of-pile experiments simulating severe fast breeder reactor (FBR) accidents. He has also performed research in sodium technology. His primary research interests involve cooling disturbances in subassemblies and their implications on the course of accidents. **Karl Mattes** (third from top right) (BS, mechanical engineering, Ingenieurschule Frankfurt, FRG, 1962; welding engineering, Schweißtechnische Lehr- und Versuchsanstalt, FRG, 1976) has worked at KfK since 1967 in the field of sodium technology. He has investigated tribology phenomena, especially self-welding of structural materials under sodium. He has also been responsible for the construction of test sections for sodium boiling experiments and other tests. He is currently working on experiments simulating fuel/coolant interactions. **F. W. Pepler** (bottom left) (MS, mechanical engineering, 1959, and PhD, nuclear engineering, 1971, University of Karlsruhe, FRG) has been at KfK since 1964. He is responsible for the performance of several out-of-pile research and development programs on severe FBR accidents. His interests are in nuclear safety and sodium technology. **Dankward Struwe** (bottom right) (Dr.-Ing.,

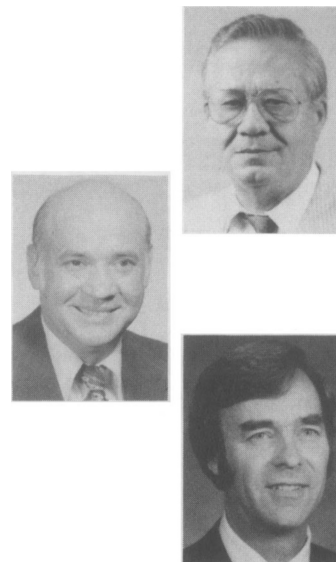


Karlsruhe University, FRG, 1977) joined KfK in 1967. He is head of the Reactor Dynamics Section of the Institute of Reactor Development.

A NEW SAFETY APPROACH IN THE DESIGN OF FAST REACTORS

Robert J. Neuhold (top) (BS, physics, Marquette University, 1953; MS, physics, University of Minnesota, 1956; PhD, nuclear engineering, Purdue University, 1968) is director of the Division of Operations and Testing, Office of Nuclear Energy, at the U.S. Department of Energy. He has been active in advanced reactor technology for over 30 years. **John F. Marchaterre** (center) (BS, 1954; MS, 1956; and ENG, 1960, chemical engineering, Michigan Technological University; MBA, University of Chicago, 1980) is director of the Reactor Analysis and Safety Division at Argonne National Laboratory. He has been active in the fast reactor safety field for many years. **Alan E. Waltar** (bottom) (BS, electrical engineering, University of Washington, 1961; MS, nuclear engineering, Massachusetts Institute of Technology, 1962; PhD, engineering science, University of California-Berkeley, 1966) is manager of core systems at Westinghouse Hanford Company. He has a broad background in fast reactor safety and currently pursues fuels and materials development for advanced reactors.

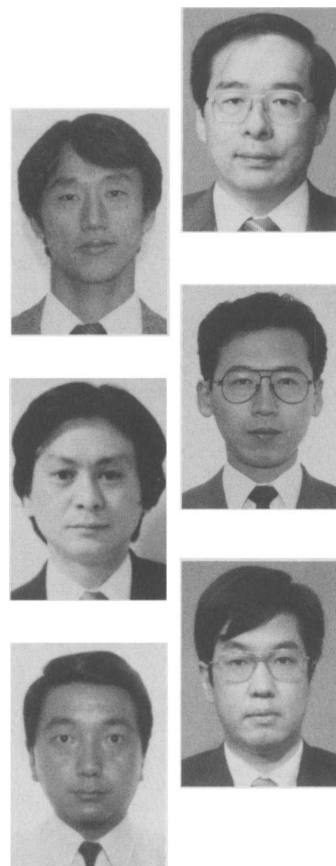
*Robert J. Neuhold
John F. Marchaterre
Alan E. Waltar*



DEVELOPMENT OF A THREE-DIMENSIONAL TRANSIENT CODE FOR REACTIVITY-INITIATED EVENTS OF BOILING WATER REACTORS— TWO ROD DROP ACCIDENT ANALYSES

Sadayuki Izutsu (top right) (PhD, nuclear engineering, Tohoku University, Japan, 1977) is an engineer in the nuclear power plant engineering department of Hitachi Works, Hitachi, Ltd. His areas of interest include nuclear design and transient method development for boiling water reactors (BWRs). **Yoshiro Kudo** (top left) (BS, nuclear engineering, University of Tokyo, Japan, 1981) is a researcher at the Nuclear Research Laboratory of Nippon Atomic Industry Group Company. He currently works on the development of reactor core dynamic analysis codes and thermal-hydraulic analysis codes for fuel assemblies. **Junichi Onuma** (center right) (MS, nuclear engineering, Musashi Institute of Technology, Japan, 1983) is an engineer in the information systems development department at Hitachi Engineering Company. His current interests are in BWR plant system analysis methods. **Tomohiko Iwasaki** (center left) (MS, Tohoku University, Japan, 1981) has worked as an engineer at Toshiba Corporation in the area of core design and safety analysis of BWRs. Since 1986, he has been engaged in research on fission cross-section measurements of transuranic elements and their transmutation in the nuclear engineering department at Tohoku University. **Sakae Muto** (bottom right) (BS, nuclear engineering, University of Tokyo, Japan, 1974; MS and MEng, nuclear engineering, University of California-Berkeley, 1981) is manager of the Engineering Division at Kashiwazaki Kariwa Nuclear Power Station, Tokyo Electric Power Company. He has been involved in core design and transient analyses of nuclear power stations. **Akio Toba** (bottom left) (MS, nuclear engineering, University of

*Sadayuki Izutsu
Yoshiro Kudo
Junichi Onuma
Tomohiko Iwasaki
Sakae Muto
Akio Toba*

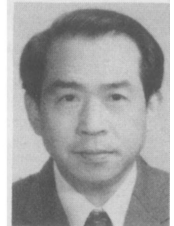


Tokyo, Japan, 1981) is an assistant manager of the Engineering Division at Fukushima Daini Nuclear Power Station, Tokyo Electric Power Company. His current interest is in the burnup extension of light water reactor fuel.

HEAT TRANSFER AND FLUID FLOW

AN EXPERIMENTAL INVESTIGATION ON TURBULENT FLOW THROUGH SYMMETRIC WALL SUBCHANNELS OF TWO ROD BUNDLES

*Shao-rong Wu
Klaus Rehme*



Shao-rong Wu (top) is a professor in the Institute of Nuclear Energy Technology at Tsing-Hua University in the People's Republic of China and was responsible for the experimental investigations and analysis of thermal hydraulics and safety of the heating reactor before 1987. In 1988, he was a visiting scientist at the Karlsruhe Nuclear Research Center. He currently works in thermal hydraulics, two-phase flow, and heat transfer of nuclear reactors and steam generators. **Klaus Rehme** [Dipl.-Ing., mechanical engineering, University of Hannover, Federal Republic of Germany (FRG), 1962; Dr.-Ing., mechanical engineering, University of Karlsruhe, FRG, 1967; Priv.-Doz., thermo- and fluid dynamics, University of Karlsruhe, FRG, 1974] has been a scientist in the Institute of Neutron Physics and Reactor Technology at the Karlsruhe Research Center since 1962 and a professor at the University of Karlsruhe since 1982. He is currently head of the Thermal Hydraulics Section. His principal research interests include fluid flow and heat transfer in noncircular channels particularly in rod bundles.



TECHNIQUES

DESTRUCTIVE GAMMA-RAY ANALYSIS OF FUEL RODS FROM THE TAIWAN RESEARCH REACTOR

Lung-Kwang Pan

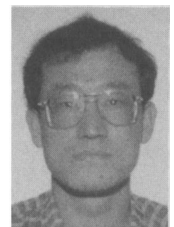


Lung-Kwang Pan (BS, nuclear engineering, 1981; MS, nuclear science, Tsing-Hua University, Taiwan, 1985) has been a lecturer in the Department of Mechanical Engineering at the Chung Cheng Institute of Technology since 1985. He has worked in the areas of destructive and nondestructive gamma detection measurement and radiochemistry. His main interest lies in instrumentation and measurement of nuclear science.

NUCLEAR SAFETY

AN EXPERT SYSTEM TO ESTIMATE TIME, RATE, AND MAGNITUDE OF RELEASE OF IMPORTANT RADIOACTIVE ISOTOPES GIVEN A LOSS OF CONTAINMENT INTEGRITY

*Kil-yoo Kim
David Okrent*



Kil-yoo Kim (right) [PhD, nuclear science and engineering, University of California-Los Angeles (UCLA), 1988] is currently with the artificial intelligence research department of the Korea Advanced Energy Research Institute. He previously worked as

a research engineer at the Korea Heavy Industry Company. His research interests include expert systems and nuclear safety. **David Okrent** (right) (PhD, physics, Harvard University, 1951) worked at Argonne National Laboratory for 20 years before becoming a faculty member of the School of Engineering and Applied Science at UCLA in 1971. His research interests include fast reactor physics, safety and technology, light water reactor safety, nuclear fuel element modeling, probabilistic risk analysis, societal risks, disturbance analysis, and expert systems.

