

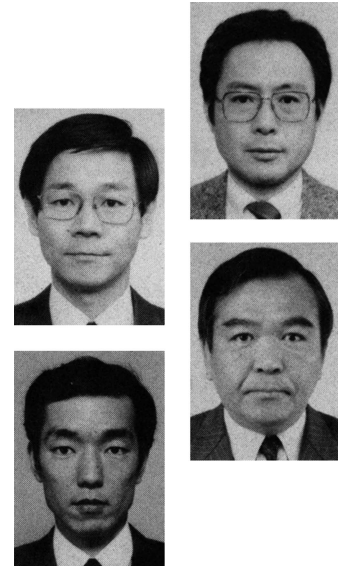
AUTHORS — JULY 1989

FISSION REACTORS

STUDY OF AN ADVANCED FUEL HANDLING SYSTEM

Noriaki Takahashi (top right) (BS, chemical engineering, University of Tohoku, Japan, 1968) is a manager in the Nuclear Systems Division at Kawasaki Heavy Industries, Ltd. (KHI), and has been responsible for the development and design of a fast breeder reactor (FBR) fuel handling system and fuel cycle. **Hideaki Morishita** (top left) (MS, mechanical engineering, University of Tokyo, Japan, 1974) is an assistant manager in the Nuclear Systems Division at KHI and has worked in the area of FBR fuel handling system development and design. His current interest is cost reduction of the fuel handling system. **Naomichi Kanegae** (bottom right) (MS, nuclear engineering, University of Tohoku, Japan, 1969) is a manager in the FBR development department at the Japan Atomic Power Company and has been engaged in the field of FBR development. **Akihiro Niimi** (bottom left) (BS, electrical engineering, Tokyo Institute of Technology, Japan, 1982) is currently an engineer in the nuclear power plant development and engineering department at Chubu Electric Power Company and has been engaged in the field of FBR development.

*Noriaki Takahashi
Hideaki Morishita
Naomichi Kanegae
Akihiro Niimi*



REDUCING UNCERTAINTY ALLOWANCE IN CORE LIMITS CALCULATIONS

John F. Carew (PhD, physics, New York University, 1968) is leader of the Light Water Reactor (LWR) Systems Group at Brookhaven National Laboratory. He has worked in the areas of reactor physics, core performance, and thermal reactor design and is presently involved in LWR safety.

John F. Carew



PRISM: A SAFE, ECONOMIC, AND TESTABLE LIQUID-METAL FAST BREEDER REACTOR PLANT

Robert C. Berglund (right) (BA, economics, Stanford University, 1955) is manager of General Electric Company's (GE's) Advance Nuclear Technology Operation, responsible for advanced liquid-metal development, government programs covering advanced water reactor concepts, and GE's decommissioning project for the Shippingport nuclear power station. He was previously manager of application engineering and projects for the GE Nuclear

*Robert C. Berglund
Frank E. Tippets
Leroy N. Salerno*



Systems Technology Operation, covering both advanced civilian reactor and space power programs. From 1969 to 1983, he served in various managerial positions in GE's commercial nuclear fuel business, covering marketing, project management, manufacturing technology, business planning, and product development programs for U.S. and international applications. **Frank E. Tippets** (top) (BS, mechanical engineering and mathematics, California Polytechnic State University, 1954; MS, mechanical engineering, University of Idaho, 1956; PhD, mechanical engineering, Stanford University, 1962) is manager of engineering for GE's Advance Nuclear Technology Operation and is in charge of the engineering for the Power Reactor Inherently Safe Module (PRISM). For 35 years, his interest and experience has been in the development and design of nuclear power systems, including the boiling water reactor, advanced space power systems, and, for over 20 years, the liquid-metal fast breeder reactor. **Leroy N. Salerno** (bottom) (BS, mechanical engineering, University of Detroit, 1958; MS, mechanical engineering, Union College, 1966) is the project manager for the GE PRISM Program. He previously had overall technical and procurement responsibility for the design, development, manufacture, and delivery of major reactor plant equipment for the Clinch River Breeder Reactor Project. Under his management, the world's largest prototype sodium pump was designed, developed, and demonstrated to meet or exceed specification requirements. He has had 25 years of experience in the nuclear industry with an extensive background in nuclear power plant design and development, equipment manufacturing and procurement, and reactor testing and services.



NUCLEAR SAFETY

***IN SITU* MEASUREMENT OF LOW-LEVEL RADIOACTIVITIES USING THE COMPTON SUPPRESSION TECHNIQUE**

Liq-Ji Yuan (top) (MS, nuclear engineering, Texas A&M University, 1969) is an associate professor at the National Tsing-Hua University (NTHU). His primary research interests are in experimental reactor physics, nuclear applications, and health physics. **Pao-Shan Weng** (center) (PhD, nuclear engineering, Texas A&M University, 1966) is a professor at NTHU. His primary research interests are in health physics and nuclear applications. **Cheng-Chang Chan** (bottom) (BE, chemical engineering, Chung Yuan Christian University, Taiwan, 1974) is a technologist at NTHU. He is now a master's degree candidate at NTHU, and his interests are in reactor water treatment and radiochemistry.

*Liq-Ji Yuan
Pao-Shan Weng
Cheng-Chang Chan*



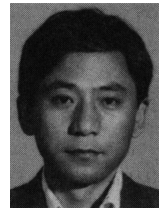
OPTIMAL SUCCESS PATH GENERATION SYSTEM BASED ON INTEGRATED RELIABILITY RULES

Tae Woon Kim (top) (PhD, nuclear engineering, Korea Advanced Institute of Science and Technology, Korea, 1986) is a probability safety analysis (PSA) group leader of the reactor safety department at Korea Advanced Energy Research Institute (KAERI). His current research interests involve the development of methods and computer codes for risk and reliability analysis of nuclear power plants and the development of computerized operator support systems based on probabilistic risk assessment methodology. **Sang Hoon Han** (bottom) (MS, nuclear engineering, Seoul National University, Korea, 1984) is a research

*Tae Woon Kim
Sang Hoon Han
Kun Joong Yoo*



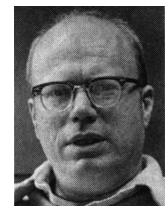
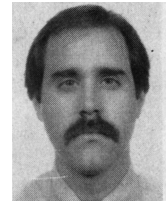
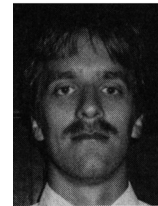
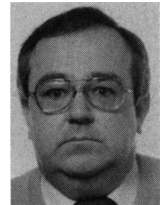
member of the reactor safety department at KAERI. His current research interests are in the development of methods and computer codes for PSA. **Kun Joong Yoo** (right) (PhD, nuclear engineering, Seoul National University, Korea, 1983) is head of the reactor safety department of the Nuclear Safety Research Division at KAERI. His current research activities involve the development of methods for system reliability analysis and neutronics calculation. He is also involved in a joint research program with the U.S. Nuclear Regulatory Commission on severe accident research.



ANALYSIS OF A PRESSURIZED WATER REACTOR NATURAL CIRCULATION TRANSIENT AT BEGINNING OF LIFE

Russell D. Mosteller (top right) [SB, physics, Massachusetts Institute of Technology (MIT), 1968; MS, 1969, and PhD, 1973, nuclear science, University of Michigan] is a senior consultant at S. Levy, Inc. He played a major role in the development and benchmarking of the Electric Power Research Institute's (EPRI's) ARMP and ARMP-02 steady-state reactor physics code packages. In recent years, his research has been devoted primarily to the development and benchmarking of codes and methods for light water reactor (LWR) core kinetics analysis. In addition, he has evaluated the impact of moderator history effects on kinetic parameters in pressurized water reactors. **Peter J. Jensen** (top left) (BS, 1982, and MS, 1984, nuclear engineering, Oregon State University) is currently with Computer Simulation and Analysis, Inc., working on RETRAN development and systems analysis. His prior experience includes 5 years at EI International, Inc., where he was program manager of RETRAN applications development. **Michael J. Anderson** (second from top right) (BS, 1980, and MS, 1982, nuclear engineering, Oregon State University; MS, mechanical engineering, Stanford University, 1988) is a senior propulsion engineer with Lockheed Aeronautical Systems Company. Prior to joining Lockheed in 1988, he was a senior engineer at S. Levy, Inc., where he was involved in the development, modification, and testing of steady-state reactor physics codes and the three-dimensional core kinetics code AROTTA. **Laurance D. Eisenhart** (center left) (BS, 1965, and MS, 1967, mathematics, Carnegie Institute of Technology; PhD, nuclear science and engineering, Carnegie-Mellon University, 1973) is a senior consultant at S. Levy, Inc. He is the principal developer of the ARROTTA coupled transient analysis code and has been involved in numerical analysis and scientific computing problems of reactor physics and safety for the past 25 years. Prior to joining S. Levy, Inc., in 1984, he held research positions at Brookhaven National Laboratory, Bettis Atomic Power Laboratory, and Westinghouse Electric Corporation. **Rana Abdollahian** (third from top right) (MS, petroleum engineering, University of Southern California, 1981) is a senior engineer at S. Levy, Inc. For the past few years, she has been involved in the modification and verification of various thermal-hydraulic and reactor physics computer codes. **Jason Chao** (bottom left) (MA, physics, University of Texas at Austin, 1974; PhD, MIT, 1979) is currently a project manager at EPRI. He has participated in plant analyses related to pressurized thermal shock, steam generator tube rupture, anticipated transient without scram, scram reduction, and reactivity transients in light of the Chernobyl accident. His past experience includes design studies of reduced enrichment fuel for research reactors for Argonne National Laboratory while employed at Science Applications, Inc., and a design study of a tokamak fusion reactor blanket at MIT. **Walter J. Eich** (bottom right) (BS, physics, Fordham University, 1952; MS, physics, Rutgers University, 1955) recently retired from a

*Russell D. Mosteller
Peter J. Jensen
Michael J. Anderson
Laurance D. Eisenhart
Rana Abdollahian
Jason Chao
Walter J. Eich*



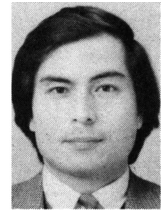
position as a scientific adviser in the Analytical Methods and Verification Program within EPRI's Nuclear Power Division. His responsibilities included the development, testing, benchmarking, and automation of LWR core physics codes and associated engineering as embodied principally in the ARMP and ARMP-02 codes. He also was the EPRI project manager for the development of the three-dimensional core kinetics code ARROTTA.

FUEL CYCLES

ANALYSIS OF A PARTIAL-REFUELING ULTRA-LONG-LIFE CORE USING METALLIC FUEL FOR 1000-MW(electric) LIQUID-METAL FAST BREEDER REACTORS

Katsuyuki Kawashima (top) (MS, physics engineering, Tokyo Institute of Technology, Japan, 1977) is a researcher at the Hitachi Ltd. Energy Research Laboratory. He has worked in the area of breeder reactor core design, and his research interests include reactor physics, reactor safety, and system optimization. **Ratib A. Karam** (PhD, nuclear engineering, University of Florida, 1963) is a professor of nuclear engineering at Georgia Institute of Technology and director of the Neely Nuclear Research Center. He worked for about 10 years at Argonne National Laboratory in the liquid-metal fast breeder reactor program. His research interests include inherently safe reactors, reactor physics, and reactor safety.

*Katsuyuki Kawashima
Ratib A. Karam*



RADIOACTIVE WASTE MANAGEMENT

PARTITIONING OF NITRIC ACID INTERMEDIATE-LEVEL WASTE SOLUTIONS BY SORPTION

Werner Faubel (top) (Dipl.-Chem., 1976, and Dr. rer. nat., fission yields and isomer ratios, 1980, University of Mainz; post-doctoral studies, pion-induced fission, Los Alamos National Laboratory, 1981) has been employed at the Institute of Radiochemistry of the Kernforschungszentrum Karlsruhe (KfK) since 1981, where he has worked in the area of developing a waste treatment method of separation of fission products and actinides from waste solutions via ion exchange. **Sameh A. Ali** (Dipl.-Chem., 1964, and Dr. rer. nat., 1967, separation and purification of transplutonium elements, University of Karlsruhe) is head of the nuclear technology group at the Institute of Radiochemistry, KfK. He is in charge of processing highly irradiated transuranium target, waste treatment, and development of separation processes of fission products for medical use.

*Werner Faubel
Sameh A. Ali*



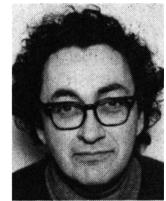
MODELING OF THE VISCOSITY OF GLASSES USED IN THE IMMOBILIZATION OF HIGH-LEVEL LIQUID NUCLEAR WASTE

Elie Saad (right) [PhD, physics, The Catholic University of America (CUA), 1988] is a senior physicist with Mobay Corporation. His interests include the physical and chemical properties of glass and ceramic oxides, optical fiber research and development, and

*Elie Saad
Normand Laurent Laberge
Xiangdong Feng*



nuclear waste disposal. **Normand Laurent Laberge** (top) (BS, civil engineering, and PhD, material science, CUA) is a research associate at the Vitreous State Laboratory (VSL) at CUA. His research interests include dielectric response of electrorheological fluids, viscoelasticity, fiber optics production and application, nuclear waste storage, and diverse topics related to the development of renewable sources of energy. **Xiangdong Feng** (bottom) (PhD, chemistry, CUA, 1988) is a research scientist at VSL. He is interested in glass chemistry with applications in chemical durability of glasses and the development of electrorheological fluids and glass optical fiber sensors.

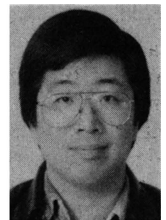


HEAT TRANSFER AND FLUID FLOW

IDENTIFICATION OF TWO-PHASE FLOW REGIMES BY NEUTRON NOISE ANALYSIS

C. H. King (top right) [PhD, nuclear engineering, National Tsing-Hua University (NTHU), Taiwan, 1988] is an associate research scientist in the Nuclear Engineering Division of the Institute of Nuclear Energy Research (INER), Taiwan. His research interests include two-phase flow pattern identification, neutron noise analysis, system modeling and simulation, digital signal process, and related techniques. **M. S. Ouyang** (top left) (BS, 1971, and MS, 1977, nuclear engineering, NTHU; PhD, mechanical engineering, University of Wisconsin, 1982) is a joint professor in the Departments of Nuclear Engineering and Mechanical Engineering of NTHU. His current interests are in reactor noise analysis, surveillance, system identification, and control. **B. S. Pei** (bottom right) (BS, nuclear engineering, NTHU, 1975; MS, 1980, and PhD, 1981, nuclear engineering, University of Cincinnati) is an associate professor in the Department of Nuclear Engineering at NTHU. His research interests include two-phase flow and heat transfer, reactor safety analysis, and severe core damaging study. **S. C. Lee** (bottom left) (PhD, nuclear engineering, University of Michigan, 1984) is an associate research scientist in the Nuclear Engineering Division at INER. His research interests include studies on two-phase flow instability and density wave oscillations, pressurized water reactor system modeling and simulation, optimal control and estimation, digital control, and related techniques.

*C. H. King
M. S. Ouyang
B. S. Pei
S. C. Lee*

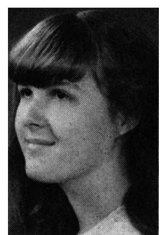
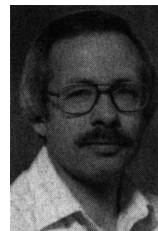


TECHNIQUES

GAS TAG BLENDING WITH LINEAR PROGRAMMING

Frank Schmittroth (top) (PhD, nuclear physics, Oregon State University, 1968) has worked for Westinghouse Hanford Company since 1970. His research interests have included nuclear data evaluation and gas tagging. He is currently interested in Monte Carlo vacuum calculations and data evaluation methods, including the assessment of groundwater flow and new methods for evaluating integrated leak rate test data for reactor containments. **Miriam A. Myjak** is currently pursuing BS degrees in mathematics and physics at Seattle University. She has worked in the areas

*Frank Schmittroth
Miriam A. Myjak*



of gas tagging and radioisotope production at Westinghouse Hanford Company for several years, most recently under a Northwest College and University Association for Science fellowship.

THE IMPORTANCE OF COLLISION EFFICIENCY IN THE COAGULATION OF NUCLEAR AEROSOL PARTICLES

A. M. Shahub (top) (BSc, MSc, and PhD, nuclear engineering, London University, United Kingdom) is engaged in postdoctoral research in meteorology at Queen Mary College. His current interests are aerosol science and dynamics of meteorology. **M. M. R. Williams** (BSc, physics, and PhD and DSc, nuclear engineering, London University, United Kingdom) is a professor of nuclear engineering at the University of Michigan. His current interests are nuclear aerosol dynamics, radioactive waste disposal, and transport theory.

A. M. Shahub
M. M. R. Williams

