



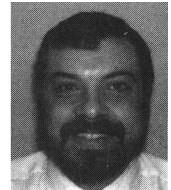
## AUTHORS — JUNE 1987

### FISSION REACTORS

#### A NEW APPROACH FOR PREDICTING STEAM VOLUME FRACTION IN TRANSIENT FLOW BOILING

**Samir M. Sami** (top) (BScA, MScA, and PhD, University of Montréal, Canada, 1981) has worked in the area of two-phase flow at various industries and institutions since graduation. He has specialized in the transient analysis of thermohydraulics and particularly thermohydraulic code developments for CANDU reactors. He is currently a professor of mechanical engineering at the University of Sherbrooke, and is involved in various projects with Atomic Energy of Canada Ltd., Westinghouse Canada Ltd., Rolls-Royce Canada, Canairtech Inc., and ASEA Ltd. **M. Kraitem** (Ing. Mec., ISIB, Brussels, Belgium, 1985) is a graduate student, at the University of Sherbrooke, Department of Mechanical Engineering.

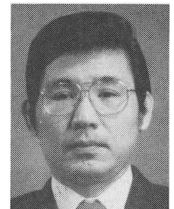
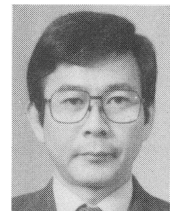
*Samir M. Sami  
M. Kraitem*



#### DEVELOPMENT OF A COMPACT DIGITAL REACTIVITY METER AND A REACTOR PHYSICS DATA PROCESSOR

**Yoichiro Shimazu** (top right) (BS, electrical engineering, National Defense Academy of Japan, 1969; MS, nuclear engineering, University of California, Berkeley, 1972; PhD, nuclear engineering, University of Tokyo, Japan, 1981) is an advisory engineer at the Nuclear Engineering Division (NED) of Mitsubishi Atomic Power Industries, Inc. (MAPI), where he is engaged in the analysis of advanced load following operation of pressurized water reactors (PWRs). **Yuzo Nakano** (top left) (graduate, mechanical engineering, Tokyo Metropolitan College of Aircraft, Japan, 1968) is a senior engineer at NED, MAPI. He is engaged in the development of a digital reactivity meter and a physics data processor. **Yoshihisa Tahara** (bottom right) (BS, physics, Sophia University, Japan, 1972) is a senior engineer at NED, MAPI. He joined the advanced PWR development program, and his current research is in the area of tight lattice core critical experiments. **Tadayoshi Okayama** (bottom left) (BS, nuclear engineering, Tokai University, Japan, 1975) is a senior engineer at NED, MAPI. He has been engaged in the development of a digital reactivity meter and is currently active as a startup engineer of nuclear power plants.

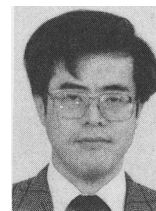
*Yoichiro Shimazu  
Yuzo Nakano  
Yoshihisa Tahara  
Tadayoshi Okayama*



## REACTIVITY ANALYSIS MODEL BASED ON FINITE DIFFERENCE METHOD FOR THREE-DIMENSIONAL FAST BREEDER REACTOR CORE DEFORMATION

**Kazuo Azekura** (MS, nuclear engineering, Osaka University, Japan, 1973) is a research staff member at the Energy Research Laboratory, Hitachi, Ltd., Japan. He has worked on reactor physics analysis methods such as coarse-mesh methods, finite element methods, and collision probability methods. He also worked on hypothetical core disruptive accident analysis of fast breeder reactors. He is now working on reactor physics analysis programs for pressure-tube-type advanced thermal reactors.

*Kazuo Azekura*



## LIQUID-METAL FAST BREEDER REACTOR CORE TRANSIENT MODELING FOR FASTER THAN REAL-TIME ANALYSIS

**Constantine P. Tzanos** [Dipl., chemical engineering, National Technical University of Athens, Greece, 1968; ScD, nuclear engineering, Massachusetts Institute of Technology, 1971] is manager of the Operational Safety Section of the Reactor Analysis and Safety Division at Argonne National Laboratory. His current research activities involve development of methods for on-line data validation, system state verification, and fault identification as well as development of system models that run faster than real time for the implementation of these methods.

*Constantine P. Tzanos*

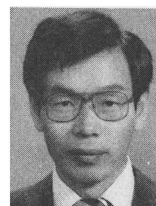
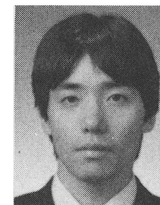


## NUCLEAR SAFETY

## MEASUREMENTS AND EVALUATIONS OF NEUTRON DOSE AND SPECTRA AT THE REACTOR TOP OF THE LIQUID-METAL FAST BREEDER TYPE REACTOR, JOYO

**Toshiso Kosako** (top right) [BE, 1972, ME, 1974, and Dr. Eng., 1977, nuclear engineering, University of Tokyo (UT), Japan] is an associate professor and head of the management section for large facilities at the Research Center for Nuclear Science and Engineering at UT. His main interests lie in neutron spectroscopy and dosimetry, radiation shielding for reactors and high-energy accelerators, and radiation protection. **Junpei Matsumoto** (top left) (BE, 1982, and ME, 1984, nuclear engineering, UT, Japan) is an engineer at Mitsubishi Atomic Power Industries, Inc. He is currently involved in the design of instrumentation and control systems of pressurized water reactors. **Akira Sekiguchi** (center right) (BE, 1948, and Dr. Eng., nuclear engineering, UT, Japan) is a professor emeritus at UT and a professor of the Saitama Institute of Technology. His current interests lie in radiation safety problems and reliability of nuclear instrumentation systems. **Nobuo Ohtani** (bottom left) (BE, 1968; ME, 1970; and Dr. Eng., nuclear engineering, Kyoto University, Japan) is an assistant senior engineer with the Reactor Research and Development Project, Power Reactor & Nuclear Fuel Development Corporation (PNC). He has been engaged in radiation shielding of fast breeder reactors. **Soju Suzuki** (bottom right) (BE, 1974, and ME, 1976, nuclear engineering, Nagoya University, Japan) is an assistant senior engineer for the experimental reactor JOYO, PNC. He has been engaged in the areas of radiation

*Toshiso Kosako  
Junpei Matsumoto  
Akira Sekiguchi  
Nobuo Ohtani  
Soju Suzuki  
Shinso Takeda  
Osamu Sato*



shielding, reactor physics, and reactor material dosimetry of liquid-metal fast breeder reactors. **Shinso Takeda** (right) (BE, chemical engineering, Nagoya Institute of Technology, Japan, 1971; MS, nuclear engineering, University of Nagoya, Japan, 1976) is an assistant senior engineer in the Safety Division, PNC. His interests lie in personal neutron dosimetry and radiation control. **Osamu Sato** (left) (BE, 1981, and ME, 1983, nuclear engineering, Tohoku University, Japan) is a researcher at Mitsubishi Research Institute, Inc., working in the computer calculation of neutron transport.

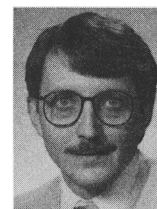


## CHEMICAL PROCESSING

### CONVERSION OF DEUTERIUM GAS TO HEAVY WATER BY CATALYTIC ISOTOPIC EXCHANGE USING WETPROOF CATALYST

**Robert J. Quaiattini** (top right) (BSc, applied chemistry, McMaster University, Hamilton, Ontario, Canada, 1978) has been a research and development (R&D) engineer at the Chalk River Nuclear Laboratories (CRNL) of Atomic Energy of Canada Limited since 1979. Previous responsibilities include catalyst performance assessment for hydrogen-water isotope separation processes. Currently, he is working on catalytic hydrogen-oxygen combination processes, as well as other catalytic processes utilizing wetproofed catalysts. **Michael P. McGauley** (top left) (diploma, chemical technology, Cambrian College, Sudbury, Ontario, Canada, 1972) is a senior technologist at CRNL. He is currently working on the development of a catalytic carbon monoxide detector. **Deborah L. Burns** (bottom right) (diploma, chemical engineering technology, Cambrian College, Sudbury, Ontario, Canada, 1981) is an R&D technologist at CRNL. She is currently involved in the testing of catalysts to determine their ability to remove carbon monoxide from breathing air, and she is also involved in testing catalysts for hydrogen-oxygen combination studies. **Paul R. Tichler** (bottom left) (MS, chemical engineering, Columbia University, 1957) is an engineer in the Reactor Division at Brookhaven National Laboratory. His current technical interests include reactor safety analysis, thermal hydraulics, and water coolant chemistry.

*Robert J. Quaiattini  
Michael P. McGauley  
Deborah L. Burns  
Paul R. Tichler*



### A SEMIEMPIRICAL EQUATION FOR ESTIMATING THORIUM NITRATE EXTRACTION BY DHPSO FROM NITRIC ACID SOLUTION

**Jiin-Shiung Horng** (top) (BS, chE, Chung Cheng Institute of Technology, Taiwan, 1967; MS, chE, University of Tennessee-Knoxville, 1970; doctor of engineering, chE, Cheng Kung University, T'ainan, Taiwan, 1986) is the deputy head of the Chemical Engineering Division at the Institute of Nuclear Energy Research (INER), Taiwan. He has worked at the Kernforschungszentrum Karlsruhe, Federal Republic of Germany, for 6 months. His broad interests include process design, interfacial phenomena of solvent extraction, adsorption, and filtration. **Wen-Shou Chuang** (bottom) (BS, chemistry, Chung Cheng Institute of Technology, Taiwan, 1972; MS, chemistry, Purdue University, 1977) is an associate scientist at INER, Taiwan. His

*Jiin-Shiung Horng  
Wen-Shou Chuang  
Ying-Chu Hoh*



interests and activities are process development, leaching, solvent extraction, and gaseous reduction. **Ying-Chu Hoh** (right) (PhD, Iowa State University, 1977) is a senior scientist and general project manager at INER. He has worked on the modeling of chemical leaching processes from kinetic and mass transfer aspects and the development of chemically based liquid-liquid extraction models for based metals, rare earths and actinides, and fluidized electrolysis. He is presently working on the electroreductive (or oxidation) stripping (or extraction), continuous ion exchange, and membrane technology.



## NUCLEAR FUELS

### RELEASE OF IODINE FROM DEFECTIVE FUEL ELEMENTS FOLLOWING REACTOR SHUTDOWN

**Brent J. Lewis** (top) (BSc, physics, 1978; MEng, fusion engineering, 1980; and PhD, nuclear engineering, 1984, University of Toronto) has been a research scientist at Chalk River Nuclear Laboratories from 1980 to the present, specializing in an experimental fuel defect program and fission product release modeling. His current activities include expert system applications to fuel failure monitoring in the power reactor and modeling of fuel behavior and activity transport phenomena during high-temperature accident conditions. **Dugald B. Duncan** (center) (PhD, University of Dundee, Scotland, 1982) is a lecturer at Heriot-Watt University, Edinburgh, Scotland. His main interest is the numerical approximation of time-dependent partial differential equations. He worked in the nuclear industry on simulations in fuel engineering and ultrasonic testing. **Colin R. Phillips** (bottom) (BE and PhD, chemical and metallurgical engineering, University of Adelaide) is a professor in the Department of Chemical Engineering and Applied Chemistry, University of Toronto, where he has been since 1969. His work includes study of the role of fluid mechanics and reaction kinetics in various transport phenomena-based processes, especially with respect to heavy oil conversion and the properties and behavior of uranium/radium in ores and tailings and of radon decay products in the atmosphere.

*Brent J. Lewis  
Dugald B. Duncan  
Colin R. Phillips*



## RADIOACTIVE WASTE MANAGEMENT

### WATER CORROSION AND RELEASE MECHANISM OF CEMENT MATRIX INCORPORATING SIMULATED MEDIUM-LEVEL WASTE

**Edmondo Zamorani** (PhD, physical chemistry, University of Ferrara, Italy, 1952; MS, nuclear engineering, Politecnico di Milano, Italy, 1956) is a scientist at the Commission of the European Communities. He contributed to the works on preparation and studies of mixed oxide U-Pu fuel pin fabrication for fast breeder reactors at the Joint Research Centre (JRC)—Transuranium Institute, Karlsruhe, Federal Republic of Germany. He is presently involved in the Waste Management Program at the

*Edmondo Zamorani*

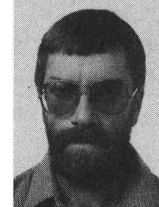


JRC, Ispra, Italy, and his interests concern the preparation, testing, and studies on the leaching mechanism of a nuclear medium and low-level waste hazardous waste immobilized in cement form.

### THE RELATIONSHIP BETWEEN GAP INVENTORIES OF STABLE XENON, $^{137}\text{Cs}$ , AND $^{129}\text{I}$ IN USED CANDU FUEL

**Simcha Stroes-Gascoyne** (top) (PhD, civil engineering, McMaster University, Canada, 1983) had broad interests in the environmental engineering field, including waste water treatment and chemistry of natural waters. She joined the Nuclear Fuel Waste Management Program of Atomic Energy of Canada Limited (AECL) in 1982 to study the dissolution of spent CANDU fuel in groundwater under a variety of redox conditions. **Lawrence H. Johnson** (center) (BSc, chemistry, University of Lethbridge, Canada, 1977) joined AECL in 1978. Until 1986, he worked principally on evaluating the dissolution properties of spent fuel for the Nuclear Fuel Waste Management Program. In 1986, he became manager of the Fuel Waste Technology Branch, responsible for the development and evaluation of engineered barriers for nuclear fuel waste disposal. **Dennis M. Sellinger** (bottom) (BSc, chemistry, University of Saskatchewan, Canada, 1982) has been with AECL since 1982. He carries out spent fuel dissolution experiments for the Nuclear Fuel Waste Management Program.

*Simcha Stroes-Gascoyne  
Lawrence H. Johnson  
Dennis M. Sellinger*

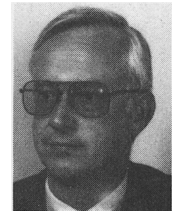


## HEAT TRANSFER AND FLUID FLOW

### ON THE DEVELOPMENT OF TURBULENT FLOW IN WALL SUBCHANNELS OF A ROD BUNDLE

**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 at the Institute of Neutron Physics and Reactor Technology at the Karlsruhe Nuclear Research Center since 1962 and a professor at the University of Karlsruhe since 1982. He is presently head of the Thermal-Hydraulics Section. His principal research interests include fluid flow and heat transfer in noncircular channels, particularly in rod bundles of liquid-metal fast breeder reactor design.

*Klaus Rehme*



## NUCLEAR SAFETY

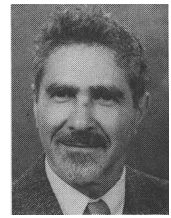
### A HISTORICAL PERSPECTIVE ON SEISMIC RISK ASSESSMENT AND BAYESIAN UPDATING

**Manuel González-Cuesta** (right) [BS, nuclear engineering, Universidad Autónoma Metropolitana, Mexico, 1978; MS, 1982, and PhD, 1985, nuclear engineering, University of California, Los Angeles (UCLA)] is currently the assistant project manager of the Laguna Verde Probabilistic Safety Assessment. His

*Manuel González-Cuesta  
David Okrent*



interests are in the application and development of risk analysis methods to nuclear plants and other industries. **David Okrent** (right) (PhD, physics, Harvard University) has been a professor in the School of Engineering and Applied Science at UCLA since 1971. He worked as a physicist at Argonne National Laboratory for 20 years before going to UCLA. He has been a member of the U.S. Nuclear Regulatory Commission's Advisory Committee on Reactor Safeguards (ACRS) for 23 years; he served as ACRS chairman in 1966.



## MATERIALS

### ENERGY DISSIPATION IN NUCLEAR CERAMIC MATERIALS

*Gerhard Karsten*

**Gerhard Karsten** (PhD, physical chemistry, University of Muenster, Federal Republic of Germany, 1962) joined the Fast Reactor Project Management at the Karlsruhe Research Center in 1964 and was responsible for fuel element development. In 1978, he took the position of a scientific manager and subsequently also that of a senior scientist at the hot cell facility at the same research center.

