



AUTHORS — DECEMBER 1985

FISSION REACTORS

A FLUIDIZED-BED NUCLEAR REACTOR CONCEPT

Farhang Sefidvash

Farhang Sefidvash (BS, mechanical engineering, West Virginia University, 1961; MS, nuclear engineering, North Carolina State University, 1964; PhD, nuclear engineering, Imperial College of Science and Technology of University of London, 1967) worked for the Atomic Energy Commission of Finland (1967-1970) in the field of neutron scattering from organic compounds and water vapor. He was a professor of nuclear and mechanical engineering at Arya-Mehr University of Technology and consultant to the Iranian Atomic Energy Commission on reactor safety (1970-1979). He worked in the Reactor Core Design Division of Kraftwerk Union in the Federal Republic of Germany on the design problems of pressurized water reactors (PWRs) (1974-1975) and also worked in the Nuclear Fuel Design Division of Framatome in France on the problem of rod bowing in PWRs (1976), being on sabbatical and leave of absence from the university. He is currently a professor of nuclear engineering at the Federal University of Rio Grande do Sul in Porto Alegre, Brazil, working on the research and development of the fluidized bed nuclear reactor.



AUTOMATIC OPTIMIZED RELOAD AND DEPLETION METHOD FOR A PRESSURIZED WATER REACTOR

*Dawk Hwan Ahn
Samuel H. Levine*

Dawk Hwan Ahn (top) (BS, Seoul National University, Korea; MS and PhD, Pennsylvania State University) is a senior researcher in the Nuclear Design Division of the Korea Advanced Energy Research Institute. His technical interests are reactor core analysis and optimization of reactor fuel cycling schemes. **Samuel H. Levine** (PhD, nuclear physics, University of Pittsburgh, 1954) is a professor of nuclear engineering and director of the Breazeale Nuclear Reactor at The Pennsylvania State University. His current technical interests are in fuel management, neutron spectrum measurements and calculations, optimization techniques, beta dosimetry, reactor design, fast reactor physics, research reactor experiments, and power reactor operation.



AN AXIALLY AND RADially TWO-ZONED LARGE LIQUID-METAL FAST BREEDER REACTOR CORE CONCEPT

Takanobu Kamei (top right) (BS, 1965; MS, 1967; and PhD, 1976, nuclear engineering, Kyoto University, Japan) is a senior researcher at NAIG Nuclear Research Laboratory. His interests center on the analyses of fast critical experiments and of large liquid-metal fast breeder reactor (LMFBR) neutronics, and on the development of calculational methods of LMFBRs through these analyses. **Mitsuaki Yamaoka** (top left) (BS, 1979, and MS, 1981, nuclear engineering, Osaka University, Japan) has been a research staff member at NAIG Nuclear Research Laboratory since 1981. His research interests include the area of reactor physics and fusion neutronics. **Yasuyuki Moriki** (center right) (diploma, Miyakonojyo Technical High School, Japan, 1975) has engaged in nuclear analysis and designing of LMFBRs at NAIG Nuclear Research Laboratory since 1975. He is now involved in the analysis of experimental data of the Japan experimental fast reactor Joyo. **Masao Suzuki** (bottom left) (BS, physics, Tokyo Institute of Technology, Japan, 1969) has worked in the area of nuclear design of the Japanese experimental fast reactor Joyo. His interests center on the core design of LMFBRs. He is presently a manager of the Core and Safety Engineering Section in the Atomic Power Division, Toshiba Corporation. **Kazuo Arie** (bottom right) (BS, 1979, and MS, 1981, nuclear engineering, Kyoto University, Japan) has been with Atomic Power Division, Toshiba Corporation, working on the core design of LMFBRs. His current interest centers on core designing directed toward cost reduction.

*Takanobu Kamei
Mitsuaki Yamaoka
Yasuyuki Moriki
Masao Suzuki
Kazuo Arie*



A CORRELATION BETWEEN OPERATION OF PRIMARY COOLANTS AT LOW pH_T WITH STEAM GENERATOR CHANNEL HEAD DOSE RATES IN WESTINGHOUSE PRESSURIZED WATER REACTORS

Martin Victor Polley (BSc, 1965, and PhD, 1969, Birmingham University, England) works for the Technical Planning and Research Division of the Central Electricity Generating Board on corrosion product activity transport in reactor circuits. He has formerly worked in the areas of fast reactors, and, over the last five years, of pressurized water reactors.

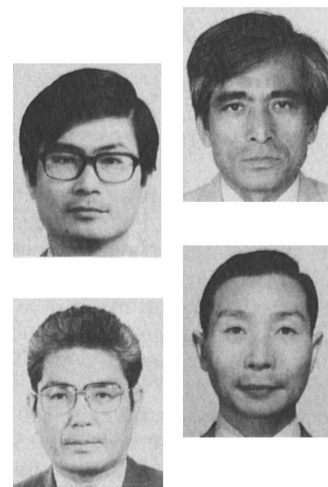
Martin Victor Polley



A MATHEMATICAL METHOD FOR BOILING WATER REACTOR CONTROL ROD PROGRAMMING

Shinji Tokumasu (top right) (PhD, numerical engineering, Kyoto University, Japan, 1984) is a chief researcher at Hitachi Research Laboratory of Hitachi, Ltd. His principal activities are in research on computer-aided design engineering for nuclear power plants and other related systems. **Michihiro Ozawa** (top left) (BS, physics, Tokyo Institute of Technology, Japan, 1971) is a technical leader of nuclear reactor engineering at Hitachi Works of Hitachi, Ltd. His principal activities are in nuclear core design and development, core management engineering, and improvement of computational methods. **Hiroshi Hiranuma** (bottom right) (PhD, nuclear engineering, Iowa State University, 1972) is a manager of nuclear power plant planning at Hitachi Works of Hitachi, Ltd. His responsibilities are in the development integration of the boiling water reactor and plant layout coordination. **Michiro Yokomi** (bottom left) (BS, physics, Tokyo

*Shinji Tokumasu
Michihiro Ozawa
Hiroshi Hiranuma
Michiro Yokomi*



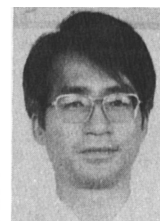
University, Japan, 1957) is a chief engineer at Hitachi Works of Hitachi, Ltd. His responsibilities are in nuclear core design and development, safety assessment, and development of light water reactors.

NUCLEAR SAFETY

A SYMPTOM-ORIENTED METHOD FOR POSTTRIP OPERATION GUIDANCE IN BOILING WATER REACTORS

*Junichi Tanji
Shunsuke Utena*

Junichi Tanji (top) (BS, nuclear engineering, University of Kyushu, Japan, 1971) is a researcher at Energy Research Laboratory, Hitachi, Ltd. He has been involved with the development of highly reliable control systems in boiling water reactor (BWR) plants for the past several years. His current research interests include man-machine systems and the automatic operation and control of nuclear power plants. **Shunsuke Utena** (BS, electrical engineering, Waseda University, Japan, 1980) is an engineer at Hitachi Works in the area of support systems for BWR power plants. His current interests are transient analysis models of BWR instrumentation systems.



RADIOACTIVE WASTE MANAGEMENT

EXPERIMENTAL AND THEORETICAL INVESTIGATIONS OF CORROSION MECHANISMS IN CEMENTED WASTE FORMS

*Bernhard Kienzler
Rainer H. Köster*

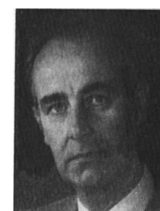
Bernhard Kienzler (top) [Dipl.-Phys., Dr. rer. nat., biological and geological sciences, Technical University of Karlsruhe, Federal Republic of Germany (FRG), 1976] has worked as a research physicist at the Karlsruhe Nuclear Research Center (KfK) since 1977. His main interests include modeling of release scenarios and transport mechanisms in the vicinity of nuclear waste disposal. **Rainer H. Köster** (Dipl.-Chem., Dr. rer. nat., physical chemistry and radiation chemistry, Technical University of Berlin, FRG, 1971) is a research chemist and head of the final disposal section at KfK. He has specialized in near-field phenomena of geologic disposal, including waste product properties, waste packaging, waste/rock interaction, and modeling of release scenarios.



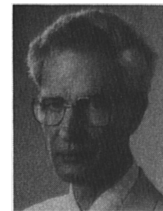
RADIATION DOSE DEPOSITION AND COLLOID FORMATION IN A ROCK SALT WASTE REPOSITORY

*Jitze Bergsma
Robert B. Helmholtz
Roel J. Heijboer*

Jitze Bergsma (top) (Dr. Phys., Leiden University, 1970) has worked in the areas of neutron scattering and crystal lattice dynamics and irradiation effects in solids. He has been with Netherlands Energy Research Foundation ECN since 1957. **Robert B. Helmholtz** (bottom) (Dr. Chem., University of Groningen) has been with ECN since 1975. His current interests



are neutron diffraction, crystallography, and computing. **Roel J. Heijboer** (right) (Dr. Phys., Technical University of Delft, Holland, 1953) has worked since 1963 in the field of reactor physics calculations at the Nuclear Centre in Petten. His current interests concern aspects of safety and public acceptance of nuclear energy.

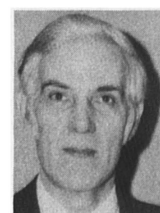


MATERIALS

THERMAL COMPATIBILITY STUDIES OF UNIRRADIATED URANIUM SILICIDE DISPERSED IN ALUMINUM

T. C. Wienczek (top) [BS, 1977, and MS, 1979, metallurgical engineering, Chicago Campus of the University of Illinois (UI-C)] joined the Materials Science and Technology Division of Argonne National Laboratory (ANL) in 1979 and is currently a staff engineering specialist in the Materials Processing and Development Group. His recent research projects have included fuel development for research and test nuclear reactors and substitution for critical and strategic materials. **R. F. Domagala** (center) [BS, 1950, and MS, 1954, metallurgical engineering, Illinois Institute of Technology (IIT)] served as a member of the metals research staff of the ITT Research Institute (formerly the Armour Research Foundation) from 1950 to 1966. In 1966 he joined the faculty of the Materials Engineering Department of UI-C as an associate professor (1966 to 1972), then professor of metallurgy (1972 to 1978). He is currently an adjunct professor of metallurgy at UI-C. He joined the Materials Science and Technology Division of ANL as a staff metallurgist in 1978. His research work has included a variety of projects; most recently his efforts have been directed toward the development of special fuels for research and test nuclear reactors. **H. R. Thresh** (bottom) (BSc, 1952, and PhD, 1957, metallurgy, University of Birmingham, United Kingdom) joined the Department of Energy, Mines, and Resources in Ottawa, Canada, as a National Research Council Fellow in 1959. From 1960 to 1967, he was involved in an extensive program on the properties of liquid metals to relate process phenomena, such as galvanizing, to liquid-metal behavior. In 1967, he joined the Casting Laboratory of Kennecott Copper. Since 1972, he has been with ANL as a group leader for the Materials Processing and Development Group in the Materials Science and Technology Division, having responsibility for the design and fabrication of hardware concepts used in the evaluation of energy programs.

*T. C. Wienczek
R. F. Domagala
H. R. Thresh*



RADIATION BIOLOGY AND ENVIRONMENT

THREE-DIMENSIONAL NEUTRON STREAMING ANALYSIS USING THE MONTE CARLO COUPLING TECHNIQUE IN A MEDICAL IRRADIATION ROOM OF THE MUSASHI REACTOR: COMPARISON WITH EXPERIMENTS

Yoshiko Harima (right) (Dr. Eng., nuclear engineering, Kyoto University, Japan, 1973) is a researcher at the Research Laboratory for Nuclear Reactors, Tokyo Institute of Technology. Her

*Yoshiko Harima
Kohtaro Ueki
Otohiko Aizawa*



interest is in radiation shielding and nuclear data. **Kohtaro Ueki** (top) (BS, nuclear engineering, Tokai University, Japan) 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. **Otohiko Aizawa** (bottom) (PhD, nuclear engineering, Tokyo Institute of Technology, Japan, 1968) is an associate professor at the Atomic Energy Research Laboratory, Musashi Institute of Technology. His technical interests are in neutron cross sections and neutron spectra measurements and in computer data analysis related to reactor physics.



HEAT TRANSFER
AND FLUID FLOW

ANALYSES OF ROSA-III BREAK AREA SPECTRUM EXPERIMENTS ON A BOILING WATER REACTOR LOSS-OF-COOLANT ACCIDENT

K. Tasaka (top right) (PhD, nuclear engineering, University of Tokyo, Japan, 1976) worked in light water reactor (LWR) safety research for ten years at the Japan Atomic Energy Research Institute (JAERI). He is the project manager of the rig of safety assessment (ROSA) program, and his current interests include analysis of thermal-hydraulic behavior during a loss-of-coolant accident (LOCA) and an anticipated transient without scram in LWRs. **Y. Koizumi** (top left) (PhD, mechanical engineering, University of Tokyo, Japan, 1977) is a research engineer for the ROSA program. His current interests include analysis of thermal-hydraulic behavior during a LOCA with emphasis on two-phase flow characteristics and heat transfer. **Y. Kukita** (second from top right) (Dr. Eng., University of Tokyo, Japan, 1975) is now at the Centre d'Etudes Nucléaires de Grenoble of the Commissariat à l'Energie Atomique, France, on leave from JAERI for technical exchange in the study of LWR small-break LOCAs and transients. **H. Nakamura** (second from top left) (MS, crystalline material engineering, Nagoya University, Japan, 1981) is a research engineer for the ROSA program. His current interests include analysis of thermal-hydraulic behavior during a LOCA with emphasis on two-phase flow characteristics. **Y. Anoda** (third from top right) (PhD, mechanical engineering, University of Tokyo, Japan, 1979) is a research engineer for the ROSA program. His current interests include two-phase flow during a LOCA. **M. Iriko** (third from top left) (BS, engineering, University of Tokyo, Japan, 1981) worked on thermohydraulic safety engineering in boiling water reactors at JAERI for three years and is now working on water reactor safety analysis at Computer Service Company. **H. Kumamaru** (bottom right) (PhD, nuclear engineering, University of Tokyo, Japan, 1980) is a research engineer for the ROSA program. His current interests include core heat transfer under LOCA conditions. **M. Suzuki** (bottom left) (MS, mechanical engineering, Kyoto University, Japan) is a research engineer for the ROSA program at JAERI. His current interests include similarity studies on LOCA phenomena between the test facility and LWR.

- K. Tasaka*
- Y. Koizumi*
- Y. Kukita*
- H. Nakamura*
- Y. Anoda*
- M. Iriko*
- H. Kumamaru*
- M. Suzuki*



A SIMPLE COMPUTER MODEL OF PELLET/CLADDING INTERACTION INCLUDING STRESS CORROSION CRACKING

James Y. Yaung (top) [BS, physics, National Taiwan University, 1975; PhD, nuclear engineering, University of California, Los Angeles (UCLA), 1983] worked from 1980 to 1985 at TRW, Redondo Beach, California, on radiation transport analyses, solar cell radiation damage modeling, and circuit analysis code (SPICE) modeling. In 1985 he joined IRT Corporation, Placentia, California, as a staff engineer. His current technical interests are in the area of single event upset, latchups, and neutral particle beam effects in advanced electronics. **D. Okrent** (center) (PhD, physics, Harvard University, 1951) is a professor in the Department of Chemical Nuclear and Thermal Engineering at UCLA. His current fields of interest include nuclear fuel element behavior, reactor safety, and risk benefit. **A. R. Wazzan** (bottom) (PhD, engineering science, University of California, Berkeley, 1963) is a professor in the Department of Chemical, Nuclear and Thermal Engineering at UCLA. His current fields of interest include light water reactor and fast breeder reactor fuel element modeling, thermal hydraulics of pressurized water reactors, and laminar boundary layers.

*James Y. Yaung
D. Okrent
A. R. Wazzan*

