nuclear technology®

AUTHORS — JULY 1981

FISSION REACTORS

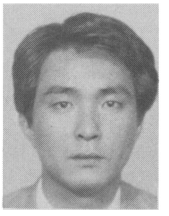
SIMULATION EXPERIMENTS ON BOILING NOISE OF BOILING WATER REACTORS

Zhang Mingchang
Zhou Gouzhen

Zhang Mingchang (top) (reactor engineering, Qinghua University, 1959) later worked a great deal in the reactor physical experimental field at the Beijing Institute of Atomic Energy. He was responsible for research and development of reactors in the physical realm. He served as director of the Department of Reactor Physical Experiment at the Southwest Nuclear Reactor Research and Design Centre, Chengdu, Sichuan, before he became deputy director of the Pressurized Water Reactor Research Institute at this center. His work has been in the areas of noise analysis, physical experiment, and other techniques on reactor engineering. His current interests focus on reactor noise technique. **Zhou Gouzhen** (reactor engineering, Beijing Electrical Power Institute, 1963) is a research engineer. For several years he worked mainly in the areas of in-core measurement system and on-line computer application to reactor physical experiment. He is now a research assistant of a director of the Pressurized Water Reactor Research Institute at the Southwest Nuclear Reactor Engineering Research and Design Centre. His current interests focus on reactor noise analysis technique.

SIMULATION STUDY OF A SYSTEM FOR DIAGNOSIS OF NUCLEAR POWER PLANT OPERATION

Jiro Wakabayashi
Akira Fukumoto



Jiro Wakabayashi (top) (BS, 1951, and DEng., 1959, electrical engineering, Kyoto University) is a professor in the Institute of Atomic Energy of Kyoto University. His current research interests are the dynamics, control, and instrumentation of nuclear power plants. He is also interested in the operators' aid system and the protection and safety system. Most of his works are analytical study and computer simulation. **Akira Fukumoto** (BS, 1977, and MS, 1979, electrical engineering, Kyoto University) is on the staff of the Nuclear Engineering Laboratory, Toshiba Corporation. He works on the operators' aid system

of nuclear power plants. Until March 1980, he was a graduate student at Kyoto University, and he studied the diagnostic system of nuclear power plants at the Institute of Atomic Energy.

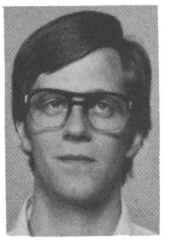
IMPROVEMENT OF BOILING WATER REACTOR START-UP CHARACTERISTICS BY CORE INLET ENTHALPY CONTROL

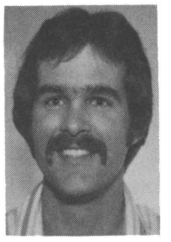
Masayuki Izumi
Renzo Takeda

Masayuki Izumi (top) (mechanical engineering, Niigata Technical High School, 1964) is a researcher of the Energy Research Laboratory, Hitachi Ltd. He worked in 1967, mainly on fast reactor safety, at the Department of Nuclear Engineering of the University of Tokyo. Since then he has been engaged in research on reactor noise analysis in boiling water reactor (BWR) plants, anomaly detection of rotating machinery, advanced BWR core design, and development of plant operation monitoring system. **Renzo Takeda** (PhD, nuclear engineering, University of Kyoto, 1980) is a chief researcher of the Energy Research Laboratory, Hitachi Ltd. He is currently interested in nuclear steam supply system design.

APPLICATION OF DIFFERENTIAL SENSITIVITY THEORY TO A NEUTRONIC/THERMAL-HYDRAULIC REACTOR SAFETY CODE

C. V. Parks
P. J. Maudlin



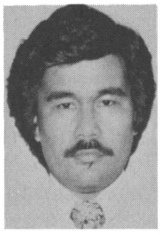


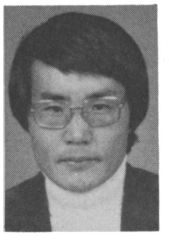
C. V. Parks (top) (BS, nuclear engineering, and BS, mechanical engineering, 1976, and MS, nuclear engineering, 1978, North Carolina State University) has worked since 1978 at Oak Ridge National Laboratory (ORNL), where he has been primarily involved with sensitivity methodology for large reactor safety codes. Besides sensitivity methodology, his interests include the thermal-hydraulic aspects of reactor safety and power plant simulation. **P. J. Maudlin** (PhD, nuclear engineering, Purdue University, 1978) is currently working at Los Alamos National Laboratory (LANL) on the development of light water reactor core meltdown methods. Prior to coming to LANL, he worked at ORNL, mainly in the area of thermal-hydraulic sensitivity theory for reactor safety codes.

NUCLEAR SAFETY

PERFORMANCE OF CONTAINMENT SPRAYS FOR LIGHT WATER REACTORS AND EVALUATION OF THE HEAT TRANSFER

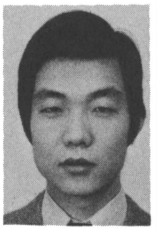
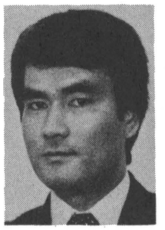
Mitsugu Tanaka
Hironori Watanabe
Kazuichiro Hashimoto
Yasuo Motoki
Mitsuo Naritomi
Gunji Nishio
Susumu Kitani





Mitsugu Tanaka (top) (DEng., chemical engineering, University of Kyushu, 1972) is a research engineer at the Japan Atomic Energy Research Institute (JAERI). He is engaged in the ROSA-IV project to investigate small loss-of-coolant accidents after the Three Mile Island accident. His interest is in the effectiveness of engineered safety features of light water reactors (LWRs). **Hironori Watanabe** (bottom) (Akita Technology

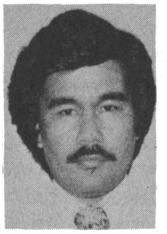
High School, 1967) is an engineer at JAERI. He is engaged in JAERI model containment (JMC) tests of spray cooling and iodine removal. His interest is in the research of spray droplets behavior projected from spray nozzles of LWRs. **Kazuichiro Hashimoto** (top right) (BS, electrical engineering, Keio University, 1976) is a research engineer at JAERI. He is presently engaged in the JMC tests of spray cooling and iodine removal and the code analysis of the containment safety. His interest is now in the advanced containment concept and the protection of radioactive materials. **Yasuo Motoki** (top left) (BS, mechanical engineering, Muroran Institute of Technology, 1971) is a research engineer at JAERI. His work has been in the area of mass and heat transfer in the containment vessel of JMC tests and was previously engaged in work on the project of uranium enrichment by gas diffusion. His interest is in the field of engineered safety test and its code analysis. **Mitsuo Naritomi** (center right) (health physics, Radiological Technology School and Health Sciences of Kyushu University, 1962) is a research engineer at JAERI. He is engaged in iodine removal tests by containment spray of JMC and the analysis of iodine removal. He has been involved in the development of sampling techniques of airborne radioiodine in LWRs and fast breeder reactors (FBRs). His current interest is in radioiodine behavior in a high-level radiation field. **Gunji Nishio** (bottom left) (chemical engineering, Professional Technology School of Tokyo Institute Technology, 1957) is a senior engineer at JAERI. He is engaged in the development of containment safety analysis of LWRs to demonstrate the effectiveness of heat and iodine removals by the spray tests of JMC and previously engaged in the safety evaluation of plutonium aerosol behavior in a liquid-metal fast breeder reactor hypothetical accident. His interest is in the field of reactor containment safety evaluation of LWRs and FBRs. **Susumu Kitani** (bottom right) (MS, 1955, and DSci., 1959, chemistry, Nagoya University) is chief of the Reactor Safety Laboratory III at JAERI. Since 1958, he has been engaged in JMC tests as the project leader, and has worked on the nuclear air-cleaning technology of LWRs, FBRs, and the spent fuel reprocessing plants. His future plans include work on iodine behavior in a high-level radiation field and the improved containment concept.

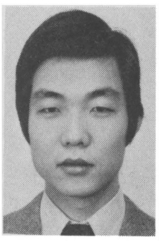

CONTAINMENT SPRAY MODEL FOR PREDICTING RADIOIODINE REMOVAL IN LIGHT WATER REACTORS

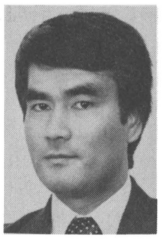
Gunji Nishio
Mitsugu Tanaka
Kazuichiro Hashimoto
Yasuo Motoki
Mitsuo Naritomi
Susumu Kitani

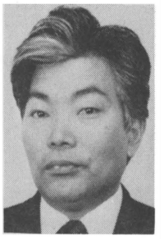
Gunji Nishio (top) (chemical engineering, Professional Technology School of Tokyo Institute of Technology, 1957) is a senior engineer at Japan Atomic Research Institute (JAERI). He is engaged in the development of containment safety analysis of light water reactors (LWRs) to demonstrate the effectiveness of heat and iodine removals by the spray tests of the JAERI model containment (JMC) and previously engaged in the safety evaluation of plutonium aerosol behavior in a liquid-metal fast breeder reactor hypothetical accident. His interest is in the field of reactor containment safety evaluation of LWRs and fast breeder reactors (FBRs). **Mitsugu Tanaka** (bottom) (DEng., chemical engineering, University of Kyushu, 1972) is a research engineer at JAERI. He is engaged in the ROSA-IV project to investigate small loss-of-coolant accidents after the Three Mile Island accident. His interest is in the effectiveness of

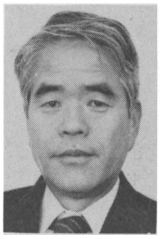


engineered safety features of LWRs. **Kazuichiro Hashimoto** (top right) (BS, electrical engineering, Keio University, 1976) is a research engineer at JAERI. He is presently engaged in the JMC tests of spray cooling and iodine removal and the code analysis of the containment safety. His interest is now in the advanced containment concept and the protection of radioactive materials. **Yasuo Motoki** (top left) (BS, mechanical engineering, Muroran Institute of Technology, 1971) is a research engineer at JAERI. His work has been in the area of mass and heat transfer in the containment vessel of JMC tests and was previously engaged in work on the project of uranium enrichment by gas diffusion. His interest is in the field of engineered safety test and its code analysis. **Mitsuo Naritomi** (bottom right) (health physics, Radiological Technology School and Health Sciences of Kyushu University, 1962) is a research engineer at JAERI. He is engaged in iodine removal tests by containment spray of JMC and the analysis of iodine removal. He has been involved in the development of sampling techniques of airborne radioiodine in LWRs and FBRs. His current interest is in radioiodine behavior in a high-level radiation field. **Susumu Kitani** (bottom left) (MS, 1955, and DSci, 1959, chemistry, Nagoya University) is chief of the Reactor Safety Laboratory III at JAERI. Since 1958, he has been engaged in JMC tests as the project leader, and has worked on the nuclear air-cleaning technology of LWRs, FBRs, and the spent fuel reprocessing plants. His future plans include work on iodine behavior in a high-level radiation field and the improved containment concept.





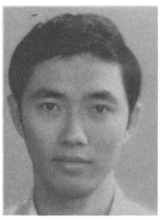




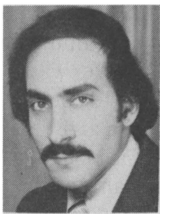
NUCLEAR FUELS

MODIFICATIONS OF THE FUEL ROD ANALYSIS PROGRAM FRAP-S3 TO ACCOUNT FOR THE EFFECTS OF FUEL INITIAL DENSITY

J. Yaung
N. Ghoniem

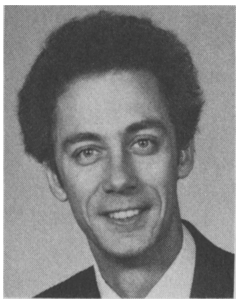


James Y. C. Yaung (top) (BS, physics, National Taiwan University, 1975; MA, physics, 1976, and MS, environmental engineering, 1977, University of Southern California) is presently a research assistant at the University of California at Los Angeles (UCLA) working on his PhD in nuclear engineering. His research interests are in the areas of light water reactor fuel element modeling and in neutron and photon transport calculations. **Nasr M. Ghoniem** [BS, nuclear engineering, University of Alexandria (Egypt), 1971; MEng., engineering physics, McMaster University (Canada), 1974; MS and PhD, nuclear engineering, University of Wisconsin, 1977] has been an assistant professor at UCLA since 1977. He has worked for one summer at the Whiteshell Nuclear Research Establishment in Canada. His research interests are in the areas of radiation damage and effects in solids, modeling of materials behavior in fission and fusion reactors, fusion technology, and computational methods.



GAS GENERATION FROM ORGANIC TRANSURANIC WASTES. I. ALPHA RADIOLYSIS AT ATMOSPHERIC PRESSURE

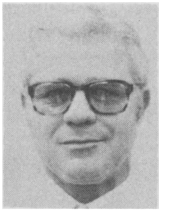
Stanley T. Kosiewicz

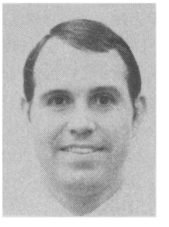


Stanley T. Kosiewicz (BS, chemistry, University of Illinois, 1967; MS, 1969, and PhD, 1973, analytical chemistry, University of Wisconsin-Madison) is a staff member at Los Alamos National Laboratory (LANL). Prior to the present research, he worked on materials compatibility problems and also on chemical analyses of plutonium materials at LANL. He worked on the research reported in this article from October 1977 to March 1980. He is currently involved in ESCA/Auger spectroscopy at LANL.

HANFORD SITE SORPTION STUDIES FOR THE CONTROL OF RADIOACTIVE WASTES: A REVIEW

R. C. Routson
G. S. Barney
R. M. Smith

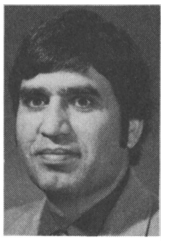


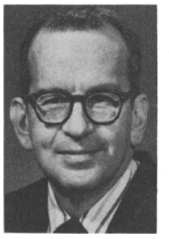


Ronald C. Routson (top) (PhD, soil chemistry, Washington State University, 1970) has been directing and conducting research on the transport of solutes through soil sediment systems with an emphasis on radionuclide transport for 14 years. He has written more than 60 open literature publications and technical reports in the above field. **G. S. Barney** (center) (PhD, inorganic chemistry, Brigham Young University, 1970) is a staff chemist with the Geochemistry Unit at Rockwell Hanford Operations. He has worked on various aspects of nuclear technology at Hanford for the past 12 years. He is currently interested in the chemistry of radionuclide/groundwater/geologic media interactions and release of radioactive wastes from geologic disposal sites. **Ronald M. Smith** (bottom) (MS, soil chemistry, Washington State University, 1977) is a soil scientist working in the field of nuclear waste management. He has been working for Rockwell Hanford Operations for three years, conducting research concerning the disposal of low-level nuclear waste to soil.

PROPERTIES OF PLUTONIUM(IV) POLYMER OF ENVIRONMENTAL IMPORTANCE

Dhanpat Rai
J. L. Swanson

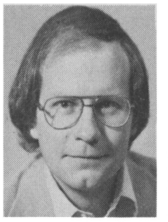


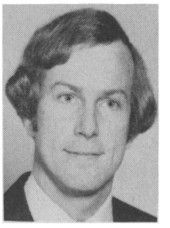


Dhanpat Rai (top) (PhD, soil chemistry, Oregon State University, 1970) has been a senior research scientist at Battelle-Pacific Northwest Laboratories (BPNL) since 1975. His research at Battelle has dealt with environmental chemistry of plutonium, neptunium, and americium, specifically as it applies to radioactive waste disposal in geologic repositories. **J. L. Swanson** (BA, chemistry, Reed College, 1951) is a senior research scientist at BPNL. He has been active in research and development in the nuclear area since joining General Electric Company at Hanford in 1951. His current areas of interest include waste management and actinide chemistry.

QUENCHING AND REWETTING OF NUCLEAR FUEL RODS

F. S. Gunnerson
T. R. Yackle

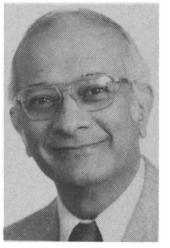




Fred S. Gunnerson (top) (BS, mechanical engineering, Colorado State University, 1972; MS, 1975, and PhD, 1979, nuclear engineering, University of New Mexico) is a senior engineer for the Light Water Reactor Fuel Research Division of EG&G Idaho, Inc. His current research interests include thermal hydraulics, boiling heat transfer, and interfacial phenomena. **T. R. Yackle** (MS, mechanical engineering, Stanford University, 1974) is a project engineer at EG&G Idaho, Inc., with interests in fuel behavior and thermal hydraulics. He was a project leader at the General Electric Company in the fast breeder reactor program.

HYDROTHERMAL TRANSFORMATIONS IN CANDIDATE OVERPACK MATERIALS AND THEIR EFFECTS ON CESIUM AND STRONTIUM SORPTION

Sridhar Komarneni
Rustum Roy



Sridhar Komarneni (top) (PhD, soil chemistry and mineralogy, University of Wisconsin-Madison, 1973) has been a research associate at the Materials Research Laboratory, The Pennsylvania State University, University Park, since 1976. He joined Penn State after two years of post-doctoral work in soil science at the University of Wisconsin-Madison. His primary research interests are in the crystal chemistry of use of clays, zeolites, and gels in nuclear waste disposal and in the chemistry of alteration and interactions of nuclear waste solids with wall rock under repository conditions. **Rustum Roy** (PhD, ceramics, The Pennsylvania State University, 1948) is professor of geochemistry and of solid state at Penn State. He has also been the director of the Penn State Materials Research Laboratory, University Park, since 1962. His main research interests are materials preparation and characterization; crystal chemistry, snythesis, stability, phase equilibria, and crystal growth in nonmetallic systems; ultra-high-pressure reactions in solids; and chemistry and physics of noncrystalline solids.