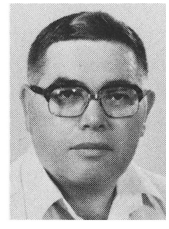
nuclear technology®

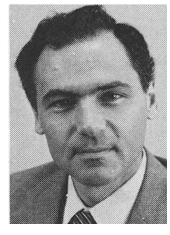
AUTHORS — MAY 1982

FISSION REACTORS

A LIQUID-METAL FAST BREEDER REACTOR CORE DESIGN WITH SEED BLANKET MODULAR ASSEMBLIES

Bal Raj Sehgal
Ching-lu Lin
Edward L. Fuller

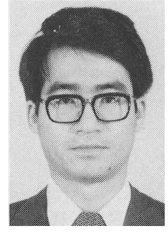


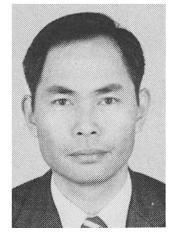


Bal Raj Sehgal (top) (PhD, University of California, Berkeley) worked at Brookhaven National Laboratory and Argonne National Laboratory (ANL) before joining the Electric Power Research Institute (EPRI) in 1974. He has just completed a 1-yr period at the Massachusetts Institute of Technology as professor of nuclear engineering, teaching a course on numerical methods. At EPRI he has managed the program on code development and validation and is currently directing work in the degraded core area. His interest range includes liquid-metal fast breeder reactor (LMFBR) and light water reactor (LWR) design and safety. **Ching-lu Lin** (center) (PhD, nuclear physics, University of Cincinnati, 1973) is a project manager at EPRI. Her present technical interests are in LMFBR core design as well as system and core thermal hydraulics for LWR safety and analysis. She recently returned from Taiwan where she was working at the Koushang-1 BWR-6 Plant of Tai Power. **Edward L. Fuller** (bottom) (PhD, nuclear engineering, University of Arizona, 1969) is currently on a loan assignment from EPRI to the IDCOR Program at Technology for Energy Corp., where he is technical manager of phenomena analysis. Prior to that, he was safety and licensing coordinator at the Clinch River Breeder Project Office. At EPRI, he worked on the Prototype Large Breeder Reactor Project. Before coming to EPRI, he worked at General Electric Co., Sunnyvale, and at ANL on LMFBR safety and design problems.

DYNAMIC ANALYSIS OF THE CONDENSATE FEEDWATER SYSTEM IN BOILING WATER REACTOR PLANTS

Junichi Tanji
Takashi Omori

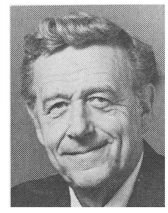
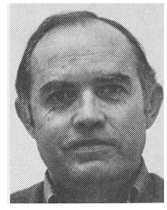




Junichi Tanji (top) (BS, nuclear engineering, University of Kyushu, 1971) is a researcher at Energy Research Laboratory, Hitachi, Ltd. He has been involved with the development of highly reliable control systems in boiling water reactor (BWR) plants for the past several years. His current research interests include the operation guidance system in nuclear power plants. **Takashi Omori** (electrical engineering, Hitachi Technical College, 1961) is an engineer at Energy Research Laboratory, Hitachi, Ltd. He has also been involved with the development of highly reliable control systems in BWR plants for the past several years. His current research interests include the on-line simulator in nuclear power plants.

EXPERIMENTAL MODELING OF HYDROGEN EVOLUTION RATES FROM SURFACES WITH EXPOSED ALUMINUM IN CONTACT WITH CONTAINMENT SPRAYS IN PRESSURIZED WATER REACTOR NUCLEAR POWER PLANTS

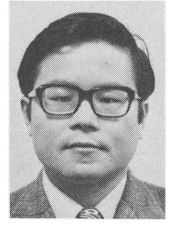
L. E. S. Smith
R. O. Lane
P. V. Guthrie

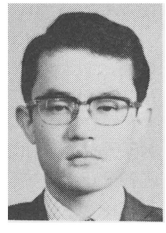
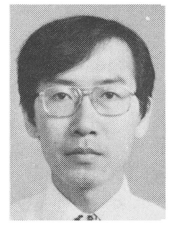
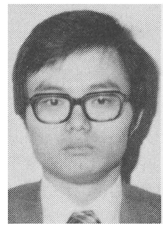




L. E. S. Smith (top) and **P. V. Guthrie** (bottom) are members of the Singleton Materials Engineering Laboratory staff directed by **R. O. Lane** (center). Current research efforts in the laboratory include metal failure analysis, stress corrosion cracking of austenitic stainless steel, hydrogen production from metal-water reactions, and thermal ignition of hydrogen/air mixtures.

ROSA-III BASE TEST SERIES FOR A LARGE BREAK LOSS-OF-COOLANT ACCIDENT IN A BOILING WATER REACTOR

K. Tasaka
M. Shiba
Y. Koizumi
Y. Anoda
N. Abe

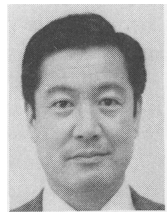


K. Tasaka (top right) (PhD, nuclear engineering, University of Tokyo, 1976) has worked for ten years in the Division of Reactor Engineering and six years in the Division of Reactor Safety at the Japan Atomic Energy Research Institute (JAERI). He is the project leader of the Rig of Safety Assessment (ROSA) Program, and his current interests include analysis of thermo-hydraulic behavior during a loss-of-coolant accident (LOCA) and an anticipated transient without scram in light water reactors. **M. Shiba** (top left) (MS, mechanical engineering, Waseda University, 1959) is chief of Reactor Safety Laboratory 1 at JAERI. He has worked for 22 years at JAERI in the field of reactor engineering and reactor safety. He is currently responsible for simulated LOCA experiments and large-scale pressure suppression tests in boiling water reactors (BWRs). **Y. Koizumi** (center right) (PhD, mechanical engineering, University of Tokyo, 1977) is a research engineer for the ROSA-III Program. His current interests include analysis of thermo-hydraulic behavior during a LOCA with emphasis on heat transfer. **Y. Anoda** (bottom left) (PhD, mechanical engineering, University of Tokyo, 1979) is a research engineer for the ROSA-III Program. His current interests include two-phase flow measurement during a LOCA. **N. Abe** (bottom right) (MS, nuclear engineering, University of Osaka, 1978) is a member of the System Analysis Group of Nippon Atomic Industry Group, Inc. He was on leave to JAERI between 1978 and 1980 to participate in the ROSA-III Program. His current interests include analysis of a BWR LOCA.

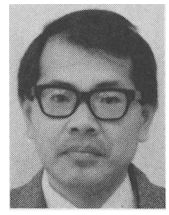
CHARACTERISTICS AND BEHAVIOR OF EMULSION AT NUCLEAR FUEL REPROCESSING

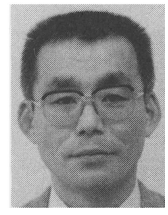
Kozo Gonda
Koichiro Oka
Takeshi Nemoto



Kozo Gonda (right) (BS, chemistry, Nagoya University, 1959; PhD, nuclear chemistry, Tokyo Institute of Technology, 1969) is group leader of the Operation Testing Laboratory (OTL) Group in the Tokai Reprocessing Plant at Power Reactor and Nuclear Fuel Development Corporation (PNC). He has been

associated since 1971 with PNC, working on the initial stage of chemical separation of uranium isotopes and on the solvent extraction process of the Tokai Reprocessing Plant for these ten years. He is currently involved in the development and demonstration on reprocessing liquid-metal fast breeder reactor fuel by the electro-reduction Purex process with mixer-settlers and pulsed column. **Koichiro Oka** (top) (BE, applied chemistry engineering, Waseda University, 1964) is a senior chemist. He joined the OTL Group in 1978 to develop the study of coprocessing. Prior to joining the OTL Group, he was a researcher at Toray Industries, Inc. **Takeshi Nemoto** (bottom) (BS, chemistry, Ibaraki University, 1962) is an associate chemist who joined PNC in 1974 to construct and operate OTL. He has also done development work in the study of coprocessing. He is currently associated with the Advanced Thermal Reactor Fuel Reprocessing Program. He had been engaged in the cooling water analysis of reactors at Japan Atomic Energy Research Institute until 1973.

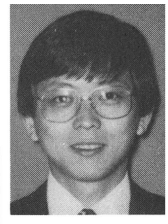


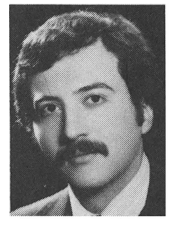


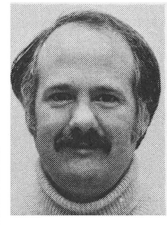
NUCLEAR FUELS

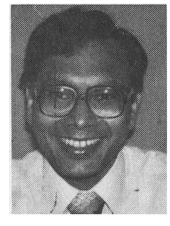
ELESTRES: A FINITE ELEMENT FUEL MODEL FOR NORMAL OPERATING CONDITIONS

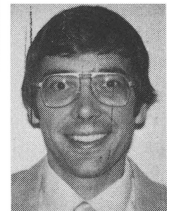
Henry H. Wong
Ertugrul Alp
W. R. Clendening
M. Tayal
Lloyd R. Jones







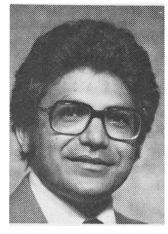




Henry H. Wong (top right) (MASc, mechanical engineering, 1978) is a nuclear design engineer at Ontario Hydro, Toronto. His research interests include thermal hydraulics, heat transfer, fuel behavior, and numerical methods. **Ertugrul Alp** (top left) (BS, mechanical engineering, Middle East Technical University, Ankara, Turkey, 1971; MASc, mechanical engineering, University of Ottawa, Ontario, 1974; PhD, mechanical engineering, University of Waterloo, 1978) has been manager of a research group at Westinghouse Canada Inc. His research interests include fuel behavior, thermal hydraulics, and heat transfer. **W. R. Clendening** (center right) (PhD, mechanical engineering, University of Waterloo, Ontario, 1972) was responsible for the fuel analysis and mathematical modeling work performed in the Westinghouse Canada Atomic Power Division until 1978. He is currently responsible for the development of the analysis methods used in the design of nuclear process systems at Atomic Energy of Canada Limited (AECL) in Mississauga, Ontario. **M. Tayal** (bottom left) (MSc, mechanical engineering, University of Saskatchewan, Canada, 1972) is a fuel engineer with AECL. His research interests include stress analysis, heat transfer, and fuel behavior under normal and accident conditions. **Lloyd R. Jones** (bottom right) (BSc, mechanical engineering, University of New Brunswick, Fredericton, New Brunswick, 1973) joined the Atomic Power Division of Westinghouse Canada Inc. upon graduation. He has spent two years on attachment at Chalk River Nuclear Laboratories working on the Canada deuterium-uranium in-reactor experimental program and has subsequently worked in the fields of fuel model development and fuel design and development.

DETERMINATION OF THERMAL ACCOMMODATION COEFFICIENTS OF HELIUM, ARGON, AND XENON ON A SURFACE OF ZIRCALOY-2 AT ABOUT 25°C

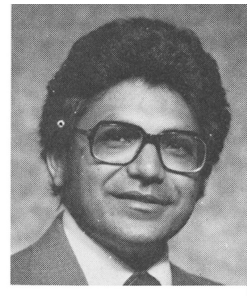
Lloyd B. Thomas
Sudarshan K. Loyalka



Lloyd B. Thomas (top) (AB, University of Missouri, 1930; PhD, University of Minnesota, 1935) is professor emeritus of chemistry at the University of Missouri-Columbia. He is internationally recognized for his pioneering work on measurements of accommodation coefficients on controlled surfaces and contributions to understanding of gas/surface interactions in general. He recently presented an invited paper, "Accommodation of Molecules on Controlled Surfaces–Experimental Developments at University of Missouri 1940–1980," at the 12th International Symposium on Rarefied Gas Dynamics at Charlottesville, Virginia (July 7-11, 1980). He was a visiting professor at the University of California, Berkeley from 1962 to 1963 and Oxford University from 1969 to 1970. **Sudarshan K. Loyalka** (BE Mech. Hons., University of Rajasthan, India, 1964; MS, 1965, and PhD, 1967, nuclear engineering, Stanford University) is a professor of nuclear engineering and James C. Dowell Professor of Engineering at the University of Missouri-Columbia. His research interests are in the areas of kinetic theory of gases, neutron transport, aerosol mechanics, and nuclear reactor physics and safety. He was a visiting scientist at Max-Planck Institut für Strömungsforschung, Gottingen, West Germany, from 1969 to 1971.

A MODEL FOR GAP CONDUCTANCE IN NUCLEAR FUEL RODS

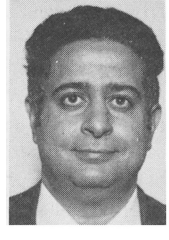
Sudarshan K. Loyalka

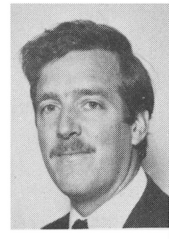


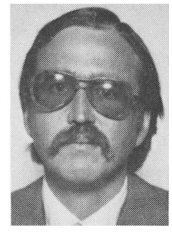
Sudarshan K. Loyalka (BE Mech. Hons., University of Rajasthan, India, 1964; MS, 1965, and PhD, 1967, nuclear engineering, Stanford University) is a professor of nuclear engineering and James C. Dowell Professor of Engineering at the University of Missouri-Columbia. His research interests are in the areas of kinetic theory of gases, neutron transport, aerosol mechanics, and nuclear reactor physics and safety. He was a visiting scientist at Max-Planck Institut für Strömungsforschung, Gottingen, West Germany, from 1969 to 1971.

COST AND OTHER EFFECTS OF REDUCED FUEL PELLET DIAMETERS

David J. Dixon
Mohamed A. Elmaghrabi
Ian C. Rickard







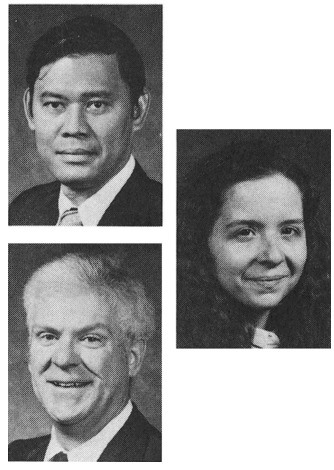
David J. Dixon (top) (BS, general engineering, University of California, Los Angeles, 1968; MS, nuclear engineering, Georgia Institute of Technology, 1970; MBA, Boston University, 1974) is currently a principal engineer in Combustion Engineering's (C-E's) business development office where, among other duties, he is involved in evaluating new designs and design modifications for C-E's nuclear fuel. **Mohamed A. Elmaghrabi** (center) (PhD, nuclear engineering, North Carolina State, 1978) is a principal physicist and a member of the Nuclear Design Group of C-E Power Systems. Before coming to the United States to attend graduate school, he had six years of research experience in reactor physics and calculations with the Egyptian Atomic Energy Authority. His technical interests currently are in fuel management, fuel cycle optimization, and core physics design. **Ian C. Rickard** (bottom) (PhD, nuclear engineering, University

of London, 1971) is currently a project manager of reload fuel in the Nuclear Power Systems Division of C-E. He was a supervisor of nuclear design for four years and prior to that was involved in the development of reactor physics methodology at C-E. His technical interests include the implementation of advanced fuel management concepts.

MATERIALS

BEND TESTING FOR MINIATURE DISKS

Fan Hsiung Huang
Margaret L. Hamilton
Gary L. Wire

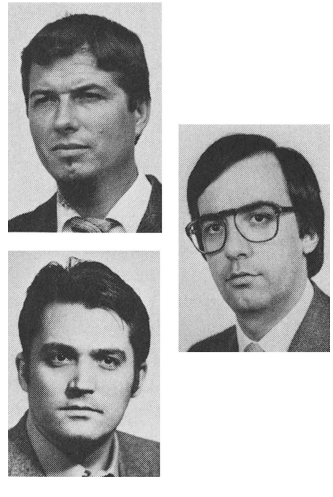


Fan Hsiung Huang (top) (PhD, solid state physics, Rensselaer Polytechnic Institute, 1973) is a senior scientist at Westinghouse Hanford Company. He has been involved in investigating the mechanical properties of developmental cladding and duct alloys for breeder reactors and fusion first-wall materials. **Margaret L. Hamilton** (center) (BS, materials engineering, Brown University, 1978) is an engineer at Westinghouse Hanford Company. She has been involved in determining steady-state and transient properties of developmental breeder reactor cladding and duct alloys. **Gary L. Wire** (bottom) (PhD, solid state physics, University of Illinois, 1972) is currently the manager of the group responsible for development of post-irradiation flow and fracture test techniques for alloy development and qualification. He has been active in the application of the mechanical equation-of-state concept to generate improved mechanical property correlations for safety analysis of breeder reactor components.

RADIOISOTOPES AND ISOTOPES

GAMMA TREATMENT OF SEWAGE SLUDGE WITH SPENT NUCLEAR FUEL

Norberto Piccinini
Rodolfo Simonetto
Giovanni Del Tin

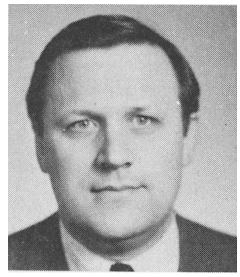


Norberto Piccinini (top) (nuclear engineering, Politecnico di Torino, Italy, 1965) is associate professor of industrial chemistry technology at the Politecnico of Turin. He is working in the field of coated nuclear fuel particles (fluid dynamics of coating furnace), gamma-lysis reactions, and the kinetics of inorganic chemistry reactions. From the first field, he has derived his main current research interest: spouted bed fluidization. **Rodolfo Simonetto** (center) (nuclear engineering, Politecnico di Torino, Italy, 1977) is presently a research engineer at Wabco-Westinghouse in Turin. His previous experience was in the field of gamma treatment of sludge and in the dynamic behavior of metallic and composite materials. **Giovanni Del Tin** (bottom) (nuclear engineering, Politecnico di Torino, Italy, 1967) is professor of nuclear engineering at the Politecnico of Turin. He is working in the field of thermal and hydraulic analysis of nuclear power plants, especially with regard to safety aspects.

HEAT TRANSFER AND FLUID FLOW

SCALING LAWS OF TRANSIENT HEAT AND MASS FLOW FOR MODELING THE LOSS-OF-COOLANT ACCIDENT

S. Benedek



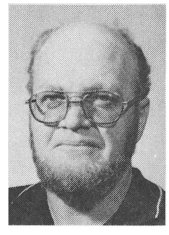
S. Benedek (Dr, mechanical engineering, TU Budapest, Hungary, 1972) is research engineer at the Electrical Power Research Institute in Budapest. His present interests are in the areas of fluid mechanics, heat transfer, reactor analysis, and safety.

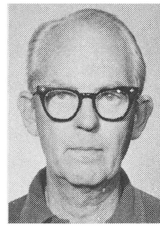
ANALYSES

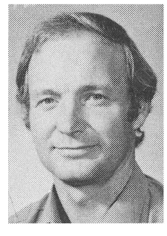
FLOW MEASUREMENT IN SODIUM AND WATER USING PULSED-NEUTRON ACTIVATION: PART 1, THEORY

FLOW MEASUREMENT IN SODIUM AND WATER USING PULSED-NEUTRON ACTIVATION: PART 2, EXPERIMENT

Howard A. Larson
Charles C. Price
Robert N. Curran
John I. Sackett



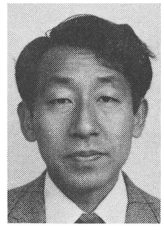




Howard A. Larson (top) (PhD, nuclear engineering, University of Washington, 1970) is a staff member of the Argonne National Laboratory Experimental Breeder Reactor II (EBR-II) Project, working in the application of reactor analysis. His current interest is the application of system codes to large liquid-metal fast breeder reactor (LMFBR) facilities. **Charles C. Price** (photo not available) (PhD, nuclear engineering, University of New Mexico, 1970) was also a staff member with EBR-II. He is an expert in in-core instrumentation and signal analysis of component vibration and is intimately familiar with EBR-II systems. His present interest is a ranch in southwestern Wyoming where he raises cattle. **Robert N. Curran** (center) (BA, physics, Knox College, 1951) is an electronics engineer in the EBR-II Project. His special interests are in instrumentation, control, and protection of LMFBRs. **John I. Sackett** (bottom) (PhD, nuclear engineering, University of Arizona, 1970) is also a staff member with EBR-II. His is manager of the Operations Analysis Section with responsibility for safety analysis in support of the EBR-II operation and modification. His current interest is in fast reactor safety.

APPLICATION OF AN ION EXCHANGE METHOD FOR SENSITIVITY IMPROVEMENT OF AN AUTOMATED RADIONUCLIDE ANALYSIS SYSTEM

Hiromi Tokoi
Hiroshi Kitaguchi
Masaaki Fujii
Katsuhiro Mizuno
Akira Ishizuka
Toyonori Kudou
Akira Ogushi



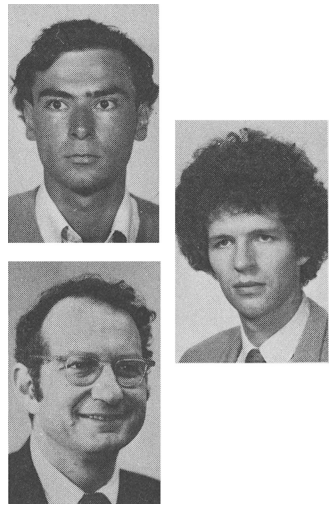
Hiromi Tokoi (top) (BS, electrical engineering, Musashi Institute of Technology, 1972) is a researcher at the Energy Research Laboratory, Hitachi, Ltd. He is currently at Japan Atomic Energy Research Institute working with the Nuclear Safety Research Reactor Project. His current interests focus on the generation mechanism of mechanical energy in a reactivity initiated accident. **Hiroshi Kitaguchi** (bottom) is a research engineer at the Energy Research Laboratory, Hitachi, Ltd. His work has been in the area of radiation monitoring in nuclear power plants. He is currently involved in the program

for nuclear plant monitoring during accidents. **Masaaki Fujii** (top right) is a senior researcher at the Energy Research Laboratory, Hitachi, Ltd. He is involved in the dose analysis of internal exposure and in radiation monitoring development for nuclear power plants. **Katsuhiro Mizuno** (top left) (BS, electrical engineering, Tokyo University, 1959) is a deputy chief engineer of the Omika Works, Hitachi, Ltd. He has directed the development and product design in the area of control and instrumentation of nuclear power plants. **Akira Ishizuka** (center right) (BS, physics, Science University of Tokyo, 1952) is a chief researcher in the Nuclear Fuel Cycle Engineering Division at the Nuclear Power Research and Development Institute of Tokyo Electric Power Company. His interests include development and implementation of nuclear power plant monitoring systems for accidental events. **Toyonori Kudou** (bottom left) (BS, electrical engineering, Tokyo Institute of Technology, 1965) is an assistant manager of the Power Development Planning Division of Tokyo Electric Power Company. He has been making plans for the future development of power resources in Japan. **Akira Ogushi** (bottom right) (BS, applied physics, Tokyo University, 1959) was a senior researcher with Hitachi, Ltd. Since 1978, he has been a senior engineer with Hitachi Medical Corporation at their Research and Development Center. His current interests are in radiation uses for medical diagnostics.

EDUCATION

ANALYTICAL APPROXIMATIONS FOR THE LONG-TERM DECAY BEHAVIOR OF SPENT FUEL AND HIGH-LEVEL WASTE

Carl M. Malbrain
Richard K. Lester
John M. Deutch



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