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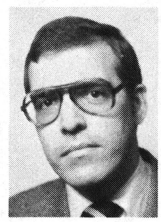
AUTHORS — DECEMBER 1983

FISSION REACTORS

PHYSICS OF A GASEOUS CORE REACTOR

Hugo van Dam
J. Eduard Hoogenboom

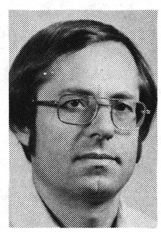


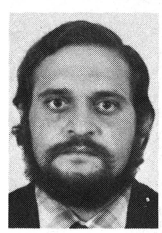
Hugo van Dam (top) (graduate physical engineer, 1964, and DSc, 1971, Delft University of Technology, The Netherlands) has been involved in reactor physics research since 1961. Currently, he is a professor of reactor physics at the Delft University of Technology and the Interuniversity Reactor Institute, with main current technical interests in noise analysis and reactor safety. **J. Eduard Hoogenboom** (graduate physical engineer, 1969, and DSc, 1977, Delft University of Technology) is a senior scientist at the Delft University of Technology. Since 1969 he has been engaged in the development of adjoint Monte Carlo methods for neutron transport analysis and, more recently, in nuclear reactor noise analysis and several other reactor physics subjects.

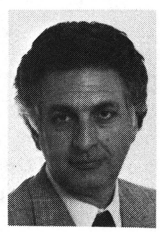
NUCLEAR SAFETY

AN ASSESSMENT OF THE CORE DEGRADATION FREQUENCY IN A TYPICAL LARGE LMFBR DESIGN FOR INTERNAL ACCIDENT INITIATORS—A COMPARISON WITH PWR PREDICTIONS

Constantine P. Tzanos
Nelson A. Hanan
Achilles G. Adamantiades



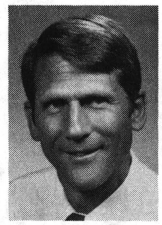


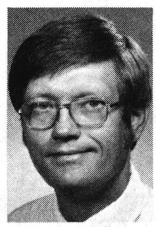


Constantine P. Tzanos (top) [Diploma, chemical engineering, National Technical University of Athens, Greece, 1968; ScD, nuclear engineering, Massachusetts Institute of Technology (MIT), 1971] is manager of the Operational Safety Section in the Reactor Analysis and Safety Division at Argonne National Laboratory. His technical interests are in the areas of reactor analysis, design, and safety. **Nelson A. Hanan** (center) (PhD, nuclear engineering, Purdue University, 1978) is an associate nuclear engineer at Brookhaven National Laboratory. His present interest is probabilistic safety analysis of light water reactors (LWRs). His past work included reactor physics, safety analysis, and probabilistic safety assessments of LWRs and liquid-metal fast breeder reactors. **Achilles G. Adamantiades** (bottom) (Diploma, mechanical and electrical engineering, National Metsovion Polytechnion of Athens, Greece, 1957; PhD, nuclear engineering, MIT, 1966) is a project manager in the Nuclear Division of the Electric Power Research Institute. In the past several years he has been engaged in a number of areas focusing on safety aspects of nuclear power. His current interests are in the area of transient fuel behavior, core performance computer codes, and alternate systems.

PERFORMANCE CHARACTERISTICS OF THE ANNULAR CORE RESEARCH REACTOR FUEL MOTION DETECTION SYSTEM

J. G. Kelly
K. T. Stalker



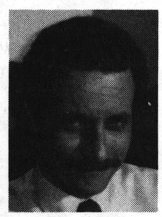


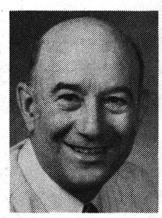
J. G. Kelly (top) (BS, physics, Stanford University, 1960; PhD, nuclear physics, University of Colorado, 1964) worked in the fields of radiation measurements and electron beam physics prior to becoming project director for the development of the annular core research reactor fuel motion detection system at Sandia National Laboratories (SNL). His continuing areas of interest are radiation measurements, radiation effects, and reactor instrumentation design. **K. T. Stalker** (BS, MS, PhD, electrical engineering, Carnegie-Mellon University) is a member of the technical staff in the Radiation Physics and Diagnostics Division at SNL. Since coming to SNL, he has worked in the areas of optics and image processing, primarily applying these techniques to nuclear fuel motion diagnostics for liquid-metal fast breeder reactor safety research. He is currently working on the application of visual diagnostics to in-core light water reactor severe fuel damage experiments.

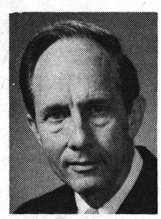
FUEL CYCLES

ITERATIVE SOLUTION TO THE OPTIMAL POISON MANAGEMENT PROBLEM IN PRESSURIZED WATER REACTORS

J. P. Colletti
Samuel H. Levine
John B. Lewis





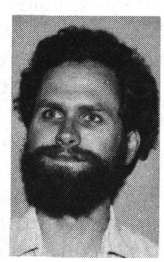


J. P. Colletti (top) (BS, physics, Michigan State University, 1969; MS, physics, Rutgers University, 1976; PhD, nuclear engineering, The Pennsylvania State University, 1981) is currently employed by Westinghouse Electric Corporation as a nuclear design engineer at the Bettis Atomic Power Laboratory. His interests include reactor design and optimization and the development of reactor analysis methods. **Samuel H. Levine** (center) (PhD, nuclear physics, University of Pittsburgh, 1954) is professor of nuclear engineering and director of the Breazeale Nuclear Reactor at The Pennsylvania State University. His technical interests currently are in fuel management, neutron spectrum measurements, research with radiation sources, and TRIGA reactors. **John B. Lewis** (bottom) (PhD, Purdue University) has been a professor of electrical engineering at The Pennsylvania State University since 1966. His interests include control systems analysis and design and optimization theory.

CHEMICAL PROCESSING

THE POSSIBILITY FOR SPARK-INITIATED EXPLOSION IN MIXTURES OF URANIUM HEXAFLUORIDE AND DEUTERIUM

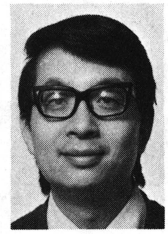
Jon L. Maienschein

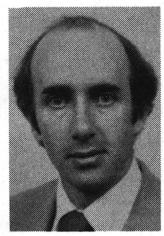


Jon L. Maienschein (BSE, chemical engineering, Princeton University, 1974; PhD, chemical engineering, University of California, Berkeley, 1980) is at the Lawrence Livermore National Laboratory in the Chemistry and Materials Science Department. His interests lie in all aspects of tritium technology, including radiochemistry, handling, processing, storage, and tritium safety.

OXIDATION OF Pu(III) BY NITRIC ACID IN TRI-*n*-BUTYL PHOSPHATE SOLUTIONS. PART II. CHEMICAL METHODS FOR THE SUPPRESSION OF OXIDATION TO IMPROVE PLUTONIUM SEPARATION IN CONTACTOR OPERATION

Yu-Keung Sze
Joseph Alfred Gosselin



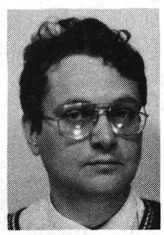


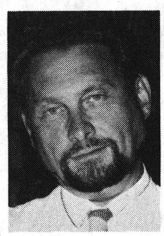
Yu-Keung Sze (top) (PhD, physical chemistry, University of Waterloo, 1974) is a research chemist in the Separations Technology Section at Whiteshell Nuclear Research Establishment. His current interests include determination of basic flow sheet parameters for recovery of the main heavy elements from thorium fuels, studies of fission product properties to improve the separation of fission products in fuel reprocessing, and studies of thermodynamic and kinetic features of the separation and recovery process. **Joseph Alfred Gosselin** (BSc, chemistry, University of New Brunswick, 1978) worked on problems related to the chemistry of fuel reprocessing, i.e., oxidation of Pu(III) by nitric acid, reduction of Pu(IV)/Pu(VI), and solvent recovery. Since 1981 he has worked for Kalium Chemicals, a potash producer, as a research chemist. He is currently involved in research on solution mining, product quality, and physical and thermal properties of salt solutions.

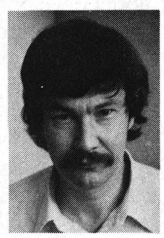
NUCLEAR FUELS

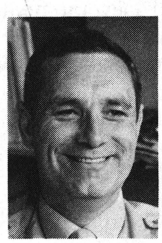
THE SODIUM-BONDING PIN CONCEPT FOR ADVANCED FUELS PART I: SWELLING OF CARBIDE FUEL UP TO 12% BURNUP

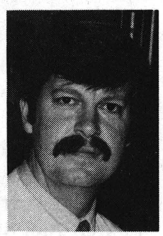
Michel Colin
Michel Coquerelle
Ian L. F. Ray
Claudio Ronchi
Clive T. Walker
Hubert Blank

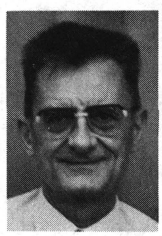








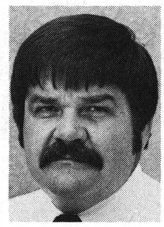


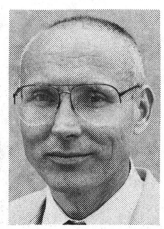


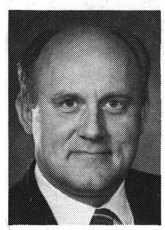
Michel Colin (top right) (PhD, materials science, Ecole des Mines, Paris, 1976) has studied fast breeder carbide fuels at the Département de Plutonium Fontenay aux Roses. Since 1981, he has performed research on absorber materials for fast reactors and recently has become responsible for the group that undertakes these studies. **Michel Coquerelle** (top left) (PhD, solid state chemistry, University of Brussels, 1960) is in charge of postirradiation examinations at the European Institute for Transuranium Elements, Karlsruhe. He gained his initial experience in this field while working for the French nuclear research center at Saclay (1960-1964). His current interests include both conventional fast breeder oxide and advanced fuels. **Ian L. F. Ray** (center right) (PhD, Oxford England, 1971) is a research officer in the Joint Research Centre (JRC) of the European Communities and is responsible for the Electron Microscopy Laboratory. He is working on the analysis of the behavior of advanced nuclear fuels. **Claudio Ronchi** (center left) (Dr. rer. nat., University of Milan, Italy, 1965) is a research officer in the JRC of the European Communities. He is working in fuel performance analysis and modeling for liquid-metal fast breeder reactors (LMFBRs) and light water reactors. His interests are mainly in solid state and thermodynamics. **Clive T. Walker** (bottom right) (PhD, materials science, University of Surrey, England, 1974) is responsible for electron microprobe analysis of irradiated fuel at the European Institute for Transuranium Elements. His technical interests focus on the physical chemistry of conventional and advanced fuels. He also contributes to investigations of the compatability of nuclear wastes with glasses and ceramics, to work on actinide crystal chemistry, and to studies of cladding corrosion in LMFBR fuel pins. **Hubert Blank** (bottom left) (PhD, metal physics, Technical University of Stuttgart, 1957), head of the Physics Division of the European Institute for Transuranium Elements Karlsruhe, has been directing the "Swelling of Advanced Fuels" project at this institute since 1973.

RADIONUCLIDE ANALYSES TAKEN DURING PRIMARY COOLANT DECONTAMINATION AT THREE MILE ISLAND INDICATE GENERAL CIRCULATION

Kenneth J. Hofstetter
C. G. Hitz
V. F. Baston
Anthony P. Malinauskas



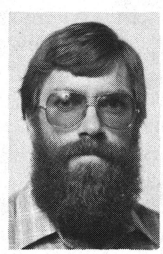


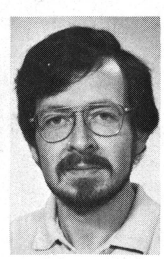


Kenneth J. Hofstetter (top right) (AB, Augustana College, 1962; PhD, nuclear chemistry, Purdue University, 1967) is the supervisor of radiochemical engineering for GPU Nuclear Corporation at Three Mile Island (TMI). It is his responsibility to provide technical support to radwaste processing and radiochemical analysis for Unit-2 recovery operations. Prior to coming to TMI in 1980, he worked at Allied General Nuclear Services (AGNS) as a radiochemistry supervisor developing nondestructive assay techniques. Following his graduate studies, he did postdoctoral work at Texas A&M University and then was an assistant professor at the University of Kentucky until 1974, when he joined the staff at AGNS. **C. G. Hitz** (top left) (BS, chemistry, 1976 Dickson College; postgraduate work in water and waste water treatment and nuclear engineering) is manager of waste management planning for the Technical Planning Department at TMI Unit-2 for GPU Nuclear Corporation. Current responsibilities include technical support for radioactive solid and liquid-waste planning, on-site solid and liquid-waste stage and large component disposal, decontamination chemicals disposal and on-site treatment, and system planning for the reactor coolant/refueling canal cleanup system. **V. F. Baston** (bottom right) (BS, engineering-chemical option, 1960, and PhD, physical chemistry, 1965, University of Wyoming; postdoctoral, physical chemistry, University of Texas at Austin; Registered Professional Engineer, Colorado) is head and corporate officer of Physical Sciences Incorporated, an engineering consulting firm. Principal consulting responsibilities involve providing technical expertise in process chemistry and engineering operations. Past experience with other corporations include analytical model development and analyses for light water reactor test programs, director for analytical laboratory and pilot plant, engineering consultant, and part-time faculty member of the University of Idaho-Idaho National Engineering Laboratory facilities. **Anthony P. Malinauskas** (bottom left) (PhD, physical chemistry, Massachusetts Institute of Technology, 1962) is head of the Chemical Development Section at Oak Ridge National Laboratory. His research interests include gas kinetic theory, separations science, nuclear fuel recycle chemistry, and nuclear fuel and fission product chemistry. He is a member of the Technical Assistance and Advisory Group for TMI-2 recovery.

LEACHING OF ^{137}Cs, ^{134}Cs, AND ^{129}I FROM IRRADIATED UO_2

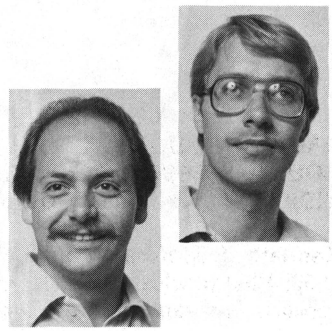
L. H. Johnson
K. I. Burns
H. H. Joling
C. J. Moore





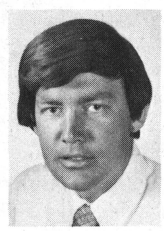
L. H. Johnson (top) (BSc, chemistry, University of Lethbridge, 1977) is employed at Whiteshell Nuclear Research Establishment (WNRE), where he has been involved since 1978 in studies of irradiated fuel dissolution under disposal conditions. His current research interests include the dissolution properties of high-level waste forms and the geochemistry of buffer and backfill materials proposed for use in a granite nuclear waste disposal vault. **K. I. Burns** (bottom) (BSc, chemistry, 1972; MSc, nuclear chemistry, 1975; PhD, nuclear chemistry, 1978, McGill University) is currently with Chalk River Nuclear Laboratories, where

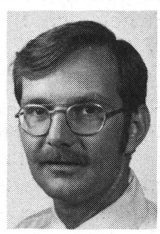
he is involved in environmental radiochemistry research. Prior to 1983, he was employed at WNRE, where he developed radiochemical methods for the analysis of nuclear fuels. **H. H. Joling** (top) (Diploma, chemical technology, Red River Community College, 1980) has been with WNRE since 1980, where he has been involved in studies of the dissolution of irradiated fuel under disposal vault conditions. **C. J. Moore** (bottom) (Diploma, chemical technology, Red River Community College, 1980) was, until 1983, involved in radiochemical analysis of nuclear fuels. His current research involves a study of the effect of post-loss-of-coolant-accident conditions on the performance of impregnated charcoal filters.



MATERIALS FOR HIGH-LEVEL WASTE CANISTER/OVERPACKS IN SALT FORMATIONS

Martin A. Molecke
James A. Ruppen
Ronald B. Diegle





Martin A. Molecke (top) (BS, chemistry, Bowling Green State University, 1967; MS, 1970, and PhD, 1972, nuclear chemistry, Carnegie-Mellon University) is a member of the technical staff in the Nuclear Waste Experimental Division at Sandia National Laboratories (SNL). He has been the technical program manager for transuranic waste experimental characterization studies (1976-1980) and high-level waste package materials interaction studies (1976 to present). His current research involvement is in *in situ* waste package performance testing in the Waste Isolation Pilot Plant. **James A. Ruppen** (center) (BA, physics, 1975; MS, metallurgy, 1978; PhD, metallurgy, 1980, University of Connecticut) has been with the Physical Metallurgy Division at SNL since 1981. His research interests include the fatigue of metals and the mechanical behavior of titanium alloys. **Ronald B. Diegle** (bottom) (BS, metallurgy, Case Institute of Technology, 1969; MS, 1972, and PhD, 1974, materials engineering, Rensselaer Polytechnic Institute) supervises the Corrosion Division at SNL, Albuquerque. He has been involved in aqueous corrosion of metals at the General Electric Research and Development Center (1965-1969), Battelle's Columbus Laboratories (1974-1981), and SNL (1981 to present). His current research interests involve localized corrosion of titanium alloys and corrosion of glassy metals.