



AUTHORS — APRIL 1988

FISSION REACTORS

AN ANALYTICAL STUDY OF VOLATILE METALLIC FISSION PRODUCT RELEASE FROM VERY HIGH TEMPERATURE GAS-COOLED REACTOR FUEL AND CORE

Susumu Mitake (top) (MSE, nuclear engineering, Tokyo Institute of Technology, Japan, 1966) has worked in the field of safety analysis of advanced reactors at the Japan Atomic Energy Research Institute. He is currently involved in assessing the safety of the fuel reprocessing plant at the Japanese Institute of Nuclear Safety. **Futoshi Okamoto** (MSE, nuclear engineering, Osaka University, Japan, 1978) is an engineer at Fuji Electric Company, Ltd. He is engaged in evaluating the safety of high-temperature gas-cooled reactors, including core designs.

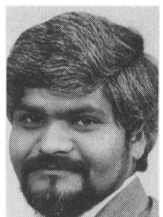
*Susumu Mitake
Futoshi Okamoto*



BOTTOM REFLOODING OF PRESSURIZED WATER REACTORS — PART I: FORCED REFLOODING AND CORE THERMAL HYDRAULICS

S. Mostafa Ghiaasiaan (top) [MSc, mechanical engineering, Imperial College, United Kingdom, 1979; PhD, mechanical engineering, University of California at Los Angeles (UCLA), 1983] is a staff scientist at Science Applications International Corporation (SAIC). His research interests and activities are in nuclear reactor thermal hydraulics and safety analysis. **A. Telal Wassel** (photo not available) (BSc, mechanical engineering, Cairo University, Egypt, 1967; MSc, 1972, and PhD, 1973, engineering and applied science, UCLA) is manager of the Thermal-Hydraulics Division and assistant vice president of SAIC. His area of expertise is in the thermal-fluid sciences and research and development aspects of high-technology energy and military systems. **Murthy S. Divakaruni** (bottom) (BSc, industrial engineering, University of Madras, India, 1971; MSc, mechanical engineering, Indian Institute of Technology, India; MS, aerospace engineering, University of Cincinnati, 1976; MBA, Xavier University, 1979) is a project manager in the fossil fuel power plant department at Electric Power Research Institute (EPRI). He was a project manager in the Nuclear Power Division of EPRI from 1981 until 1986.

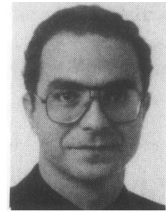
*S. Mostafa Ghiaasiaan
A. Telal Wassel
Murthy S. Divakaruni*



BOTTOM REFLOODING OF PRESSURIZED WATER REACTORS — PART II: OSCILLATORY FLOW DURING GRAVITY-FEED REFLOODING

S. Mostafa Ghiaasiaan (MSc, mechanical engineering, Imperial College, United Kingdom, 1979; PhD, mechanical engineering, University of California at Los Angeles, 1983) is a staff scientist at Science Applications International Corporation. His research interests and activities are in nuclear reactor thermal hydraulics and safety analysis.

S. Mostafa Ghiaasiaan



THE USE OF INHERENT REACTIVITY FEEDBACKS TO IMPROVE FAST REACTOR AVAILABILITY

Ralph M. Singer (BS, chemical engineering, Illinois Institute of Technology, 1958; PhD, chemical engineering, University of Minnesota, 1962) is currently a senior engineer at Argonne National Laboratory where he has worked since 1962, including 2-year assignments to the Consolidated Management Office for the liquid-metal fast breeder reactor of the Electric Power Research Institute and the Technical Management Center for Fast Reactor Safety for the U.S. Department of Energy. His primary interests have been in thermal hydraulics, fast reactor safety, and plant systems design. He is currently working on applications of artificial intelligence to fast reactor safety and control.

Ralph M. Singer

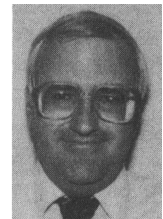


NUCLEAR SAFETY

ANALYSIS OF INSTRUMENT TUBE RUPTURES IN THE ZION-1 PRESSURIZED WATER REACTOR

C. Don Fletcher (top) (MS, aerospace engineering, University of Colorado, 1969) is a senior engineering specialist at the Idaho National Engineering Laboratory (INEL). He has been a lead analyst supporting U.S. Nuclear Regulatory Commission (NRC) light water reactor (LWR) safety programs since 1976. His recent work has also included analysis of varied reactor designs such as the SP-100 space reactor, advanced LWRs, the Chernobyl-4 reactor, and U.S. Department of Energy (DOE) reactors. **Mark A. Bolander** (MS, mechanical engineering, Brigham Young University, 1978) is a senior engineer at INEL. He has been a thermal-hydraulic analyst supporting NRC LWR safety programs since 1979. He is currently working on safety analysis of a DOE reactor.

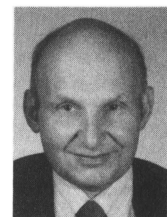
C. Don Fletcher
Mark A. Bolander



THE POSSIBILITY OF LOCAL DETONATIONS DURING DEGRADED-CORE ACCIDENTS IN THE BELLEFONTE NUCLEAR POWER PLANT

Martin P. Sherman (right) (PhD, aeronautical engineering, Princeton University, 1964) is a member of the technical staff of Sandia National Laboratories (SNL) in the Severe Accident Containment Response Division. He has been conducting experimental work on flame acceleration and transition to detonation. Prior to this work, he was involved in the development of the

Martin P. Sherman
Marshall Berman



HECTR containment response computer program. **Marshall Ber-**
man (right) (PhD, nuclear physics, Wayne State University,
 1969) is supervisor of the Severe Accident Containment Response
 Division at SNL. His staff is currently conducting theoretical and
 experimental research on topics including fuel/air combustion
 and fuel/coolant interactions. During his career, he has studied
 electromagnetic phenomena, optics, hydrodynamics, radiation
 heat transfer, and fluid mechanics related to nuclear reactor
 safety and weapons research.

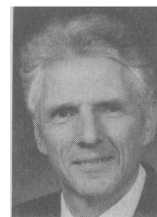


NUCLEAR FUELS

FISSION PRODUCT IODINE AND CESIUM RELEASE BEHAV-
IOR UNDER LIGHT WATER REACTOR ACCIDENT CONDI-
TIONS

Jack L. Collins (top right) (BS, chemistry, University of Tennes-
 see, 1963) has worked in nuclear-related fields during most of his
 24 years as a staff member at Oak Ridge National Laboratory
 (ORNL). His work activities have been in the areas of transura-
 nium chemistry, advanced breeder reactor fuel development, and
 light water reactor (LWR) safety studies. He has a special interest
 in characterizing the chemical behavior of released fission prod-
 ucts under severe LWR accident conditions. **Morris F. Osborne**
 (top left) (BA, physics, University of North Carolina at Chapel
 Hill, 1953) has worked at ORNL for more than 30 years in a
 variety of research areas. Since 1966 he has specialized in stud-
 ies on the safety of both LWRs and high-temperature gas-cooled
 reactors. His primary interests are in the areas of fuel behavior
 and fission product release and behavior, especially under acci-
 dent conditions. He represented the U.S. Nuclear Regulatory
 Commission (NRC) as a visiting scientist in core melt research
 at Kernforschungszentrum Karlsruhe, Federal Republic of Ger-
 many, from 1975 to 1977. **Richard A. Lorenz** (bottom right) (BS,
 chemical engineering, Iowa State University) has worked at
 ORNL since 1951. He began LWR safety studies in 1960,
 specializing in fission product release tests and modeling. He
 supervised NRC research programs at ORNL in the fields of fis-
 sion product release, iodine behavior in containment, and aerosol
 transport and resuspension. **Anthony P. Malinauskas** (bottom
 left) (PhD, physical chemistry, Massachusetts Institute of Tech-
 nology) is director of the NRC programs at ORNL. He has been
 involved in fission product source term studies and in the devel-
 opment of nuclear fuel reprocessing, separation science, gas
 kinetic theory, and aerosol physics.

Jack L. Collins
Morris F. Osborne
Richard A. Lorenz
Anthony P. Malinauskas



RADIOACTIVE WASTE
 MANAGEMENT

STABILITY EVALUATION FOR CEMENT PACKAGE CON-
TAINING RADIOACTIVE WASTE

Koichi Chino (right) (BS and MS, mechanical engineering,
 Tokyo Institute of Technology, Japan, 1974; Dr. Eng., Nagoya
 University, Japan, 1985) is a senior researcher at Hitachi, Lim-
 ited, Energy Research Laboratory (ERL), where he is involved

Koichi Chino
Fumio Kawamura



in radioactive waste management. **Fumio Kawamura** (right) (BS, chemical engineering, Gunma University, Japan, 1970; MS and Dr. Eng., Tohoku University, Japan, 1976) is a senior researcher at ERL where he is involved in fuel reprocessing.



DIFFUSION AND SORPTION OF CESIUM, STRONTIUM, AND IODINE IN WATER-SATURATED CEMENT

Alan Atkinson (top) (MA, Cambridge University, United Kingdom, 1967; PhD, physics, Leeds University, United Kingdom, 1971) joined the Harwell Laboratory in 1975 to work on diffusion in oxides and high-temperature oxidation of metals. He began work in the radioactive disposal area in 1980 on ceramic systems for radioactive waste encapsulation and their leaching properties. More recently, his work has concentrated on the properties of cement and concrete for use in waste disposal strategies, particularly their chemistry, durability, and mass transport characteristics. **Allan K. Nickerson** (associate member, Institute of Metals, 1984) began his career at Harwell in 1973, first working on plasma-sprayed protective coatings and, later, on high-temperature corrosion. He also started work in the radioactive waste area by synthesizing and evaluating ceramic waste forms. His main field of interest now is the study of transport in cement and concrete using techniques such as tracer diffusion, ionic conductivity, and fluid permeability.

*Alan Atkinson
Allan K. Nickerson*

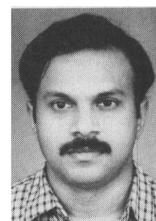


MATERIALS

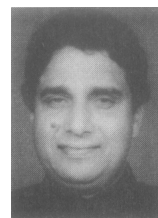
CREEP PROPERTIES OF THREE HEATS OF TYPE 316 STAINLESS STEEL FOR ELEVATED TEMPERATURE NUCLEAR APPLICATIONS

M. D. Mathew (top right) (BSc, 1974, and MSc, 1976, University of Kerala, India; AMIE, metallurgy, Institution of Engineers, India, 1982) joined the Indira Gandhi Centre for Atomic Research (IGCAR), Materials Development Laboratory (MDL) in 1976. His main interest is in the area of creep deformation and fracture. **S. Latha** (top left) (BSc, physics, Madurai-Kamaraj University, India, 1981) joined MDL in 1983 and has been involved in studying the creep and tensile properties of fast reactor materials. **G. Sasikala** (bottom right) (BSc, physics, University of Kerala, India, 1979; MSc, physics, Sardar Patel University, India, 1982) joined MDL in 1983. Her primary interest is in the study of creep behavior of materials. **S. L. Mannan** (bottom left) (BSc, physics, Punjabi University, India, 1965; MSc, physics, University of Bombay, India, 1969; PhD, metallurgy, Indian Institute of Science, Bangalore, India, 1981) joined the Bhabha Atomic Research Centre (BARC), Metallurgy Division, in 1966. He is presently head of the Mechanical Metallurgy Section of the MDL, IGCAR. His current interest is in the area of high-temperature deformation and fracture, particularly creep, fatigue, and fracture of fast reactor materials. He was visiting assistant professor at North Carolina State University from 1982 to 1984.

*M. D. Mathew
S. Latha
G. Sasikala
S. L. Mannan
P. Rodriguez*



P. Rodriguez (right) (BSc, chemistry, University of Kerala, India, 1958; BE, metallurgy, University of Tennessee, 1965; PhD, metallurgy, Indian Institute of Science, Bangalore, India, 1976) joined BARC, Metallurgy Division, in 1961. Since 1974, he has been at IGCAR and is presently head of the metallurgy program and the Materials Science Laboratory. From 1963 to 1965 he was a visiting scientist at Oak Ridge National Laboratory.



HEAT TRANSFER
AND FLUID FLOW

A NOTE ON HEAT AND MASS TRANSFER TO A SPRAY DROPLET

Jeremy D. M. Linn (top) (BSc, mathematics, Liverpool University, United Kingdom, 1985) is a postgraduate student researching for a PhD degree in the chemical engineering department at Exeter University (EU). He is working on the problem of heat and mass transfer to droplet-laden flows, using mathematical and numerical models. **Stephen J. Maskell** (center) (PhD, applied mathematics, Manchester, United Kingdom, 1969) is a lecturer in the mathematics department at EU. He has worked on heat and mass transfer in recirculating laminar and turbulent flows, and on fluid mixing and is currently investigating moving boundary techniques for the solution of reacting two-phase flows. **Mike A. Patrick** (bottom) (PhD, fuel technology, Sheffield University, United Kingdom, 1965) is director of the Centre for Industrial and Geophysical Fluid Dynamics and senior lecturer in chemical engineering at EU. His current research interests lie in the field of reactor safety, use of mass transfer analogs in the modeling of process heat transfer, reacting two-phase flows, and computational fluid dynamics.

*Jeremy D. M. Linn
Stephen J. Maskell
Mike A. Patrick*

