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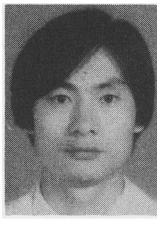
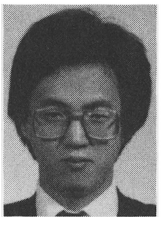
AUTHORS — AUGUST 1986

FISSION REACTORS

DEVELOPMENT OF A COMBINED ALGORITHM OF ON-LINE INSTRUMENT FAILURE DETECTION WITH AN IMPROVED GENERALIZED LIKELIHOOD RATIO METHOD AND SUBOPTIMAL CONTROL ON A PWR PRESSURIZER

Hack Yeong Chung
Soon Heung Chang

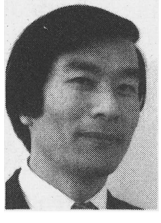


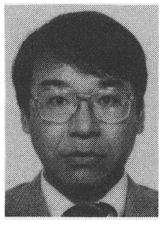


Hack Yeong Chung (top) [BS, electronic engineering, Kyung Pook National University, Korea, 1983; MS, nuclear engineering, Korea Advanced Institute of Science and Technology (KAIST), Seoul, Korea, 1985] is presently working at the Korea Electric Power Corporation in the control section of the Nuclear Energy Division. His interests lie in the areas of linear, nonlinear, and adaptive filtering system failure diagnosis, system identification, and stochastic control. **Soon Heung Chang** (BS, nuclear engineering, Seoul National University, Korea, 1976; MS and PhD, nuclear engineering, Massachusetts Institute of Technology, 1981) is an associate professor in the Department of Nuclear Engineering at KAIST. His research activities include thermal-hydraulic safety analysis and probabilistic risk assessment, including natural circulation, severe accident phenomena, computer aided operation, data treatment, and uncertainty and sensitivity analysis.

APPLICABILITY OF A MULTIVARIABLE AUTOREGRESSIVE METHOD TO BOILING WATER REACTOR CORE STABILITY ESTIMATION

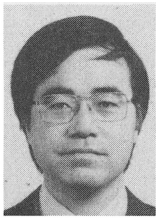
Satoshi Suzuki
Kohyu Fukunishi
Shoichi Kishi
Yuichiro Yoshimoto
Kunikazu Kishimoto





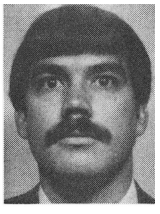
Satoshi Suzuki (top) (MS, electrical enginneering, Tokyo Metropolitan University, Japan, 1973) is a researcher at the Energy Research Laboratory (ERL), Hitachi, Ltd., Japan. He works in the area of monitoring and control of nuclear power plants. His current interests are in the fields of system identification and computer control. **Kohyu Fukunishi** (center) (PhD, control engineering, Osaka University, Japan, 1977) has been a senior researcher at Advanced Research Laboratory (ARL), Hitachi, Ltd., since April 1985 when it was founded. His research interests include human interface, neural mechanism of cognitive function, and artificial intelligence. Prior to joining ARL, he was responsible for the studies of control and supervision of the nuclear power plant at ERL. From 1979 to 1980, he was a visiting researcher at the U.K. Atomic Energy Authority's Culham Laboratory. **Shoichi Kishi** (bottom) is a research engineer at ERL. From 1962 to 1967 he worked on reactor

instrumentations. Since 1968 he has worked on computer control systems for nuclear power plants. **Yuichiro Yoshimoto** (top) (MS, control engineering, Tokyo Institute of Technology, Japan, 1973) is a senior engineer of nuclear reactor engineering at Hitachi Works, Hitachi, Ltd. His principal activities are in thermal-hydraulics and core dynamics design. **Kunikazu Kishimoto** (bottom) (MS, nuclear engineering, Tokyo Institute of Technology, Japan, 1975) is an assistant manager of nuclear power plant engineering at the Tokyo Electric Power Company, Inc. His principal activities are in reactor core component design and safety management for operating reactors.

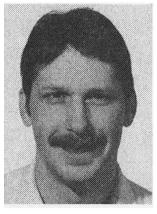


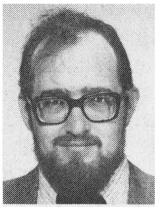
AN APPLICATION OF NONLINEAR FILTERING TO INSTRUMENT FAILURE DETECTION IN A PRESSURIZED WATER REACTOR

Steven J. Eckert
Kenneth A. Loparo
Zvi S. Roth



Steven J. Eckert (top) (BS, physics, Hope College, Holland, Michigan, 1982; MS, 1984, and PhD, 1986, systems engineering, Case Western Reserve University, Cleveland, Ohio) is currently working with the Microelectronics Applications Group of The Analytic Sciences Corporation in Reading, Massachusetts. **Kenneth A. Loparo** (center) (BS, 1972, and MS, 1973, mechanical engineering, Cleveland State University; PhD, systems engineering, Case Western Reserve University, 1977) joined the faculty of the mechanical engineering department of Cleveland State University, Cleveland, Ohio, in 1977. In 1979, he joined the systems engineering faculty at Case Western Reserve University where he is currently an associate professor and associate director of the Center for Automation and Intelligent Systems. His research interests are in the areas of nonlinear and stochastic control, nonlinear filtering with applications to fault detection and intelligent control. **Zvi S. Roth** (bottom) (BS, 1974, and MS, 1979, electrical engineering, Technion, Israel Institute of Technology; PhD, systems engineering, Case Western Reserve University, 1982) has been an assistant professor at Florida Atlantic University, Boca Raton, Florida, since 1982. He is currently the director of the Florida Atlantic University Robotics Center. His current research interests are estimation theory with applications to process diagnostics and robot dynamics and control.





EVALUATION OF THE TRITIUM CONTENT IN LIGHT WATER REACTOR CONTROL AND ABSORBER RODS TO OBTAIN DATA FOR THE FUEL CYCLE BACKEND

Alois Bleier
Karl Heinz Neeb
Eike Gelfort
Joachim Mischke

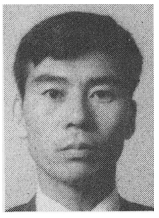
Alois Bleier (top right) [Dipl. Eng., technical chemistry, Georg-Simon-Ohm-Fachhochschule Nürnberg, Federal Republic of Germany (FRG), 1972] has worked in radiochemistry at Kraftwerk Union Company, Erlangen, FRG, since 1974. His interests are concerned with the buildup of fission and activation products and with the behavior of these radionuclides under the conditions of nuclear power plants, fuel reprocessing, and waste disposal. **Karl Heinz Neeb** (top left) (Dr. rer. nat., Dipl.-Chemiker, University of Mainz, FRG) works in the field of radiochemistry and postirradiation examinations at the Kraftwerk Union's Division of Reactor Technology. His main interests center on the formation and behavior of radionuclides in nuclear power plants. **Eike Gelfort** (bottom right) (Dr. rer. nat., Dipl.-Physicist, University of Heidelberg, FRG, 1972) is head of the Department of Research and Development at Deutsche Gesellschaft für Wiederaufarbeitung von Kernbrennstoffen mbH (DWK). His current responsibilities include waste management and conditioning. **Joachim Mischke** (bottom left) (Dipl.-Ing.-Ing., mechanical

engineering, Technical University of Darmstadt, FRG, 1959) is a member of the Board of Directors of the DWK in Hannover. He is responsible for all technical projects, including the planning of the new reprocessing plant in Bavaria.

NUCLEAR SAFETY

MEASUREMENT OF DOSE RATES AND MONTE CARLO ANALYSIS OF NEUTRONS IN A SPENT-FUEL SHIPPING VESSEL

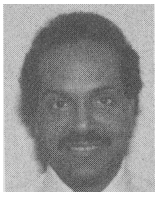
Kohtaro Ueki
Yoshihito Namito
Takayoshi Fuse



Kohtaro Ueki (top) (PhD, nuclear engineering, Kyoto University, Japan, 1985) has been a senior researcher at the Ship Research Institute in Tokyo 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. **Yoshihito Namito** (center) (MS, nuclear engineering, Tokyo Institute of Technology, 1985) is a researcher at the Ship Research Institute. His technical interests are improvement of the Monte Carlo method for shielding analysis and finding the optimum materials arrangement for shielding. **Takayoshi Fuse** (bottom) (BS, physics, Touhoku University, 1956) is a director of the Nuclear Technology Division at the Ship Research Institute. His technical interests are neutron spectrum measurements; he has worked mainly in the safety assessment of the naval transport of spent fuel.

ANALYSIS OF FLECHT AND FLECHT-SEASET REFLOOD TESTS WITH RELAP5/MOD2

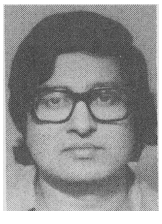
Yassin A. Hassan



Yassin A. Hassan (BS, nuclear engineering, University of Alexandria, Egypt, 1968; MS, 1975, and PhD, 1979, nuclear engineering, University of Illinois) is a principal engineer at the Nuclear Power Division, Babcock & Wilcox Company, Lynchburg, Virginia. His interests include computational methods, testing and analysis in fluid flow, and heat transfer.

THE INFLUENCE OF PARTICLE PHASE SIZE ON THE DISASSEMBLY ACCIDENT TRANSIENT IN FAST REACTORS

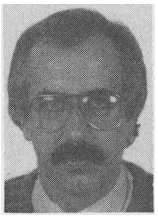
Subhash Chandra



Subhash Chandra (MSc, physics, Aligarh University, India) has been working in the Theoretical Physics Division of Bhabha Atomic Research Centre since 1970 on various problems of reactor kinetics and safety. His current interest is the modeling aspects of two-phase flows arising in fast and thermal reactor accidents and in inertially confined fusion systems.

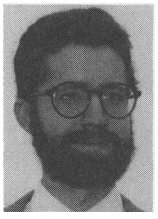
DYNAMIC LOGICAL ANALYTICAL METHODOLOGY VERSUS FAULT TREE: THE CASE STUDY OF THE AUXILIARY FEEDWATER SYSTEM OF A NUCLEAR POWER PLANT

P. C. Cacciabue
A. Amendola
G. Cojazzi



P. C. Cacciabue (right) (Dr. Ing., nuclear engineering, University of Torino, Italy, 1973) joined the high-temperature gas-cooled reactor Dragon research project at Winfrith, United

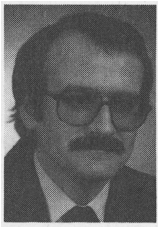
Kingdom, in 1975, where he worked in the field of fission gas distribution and reactor safety. In 1976 he joined the Joint Research Centre (JRC), Ispra and worked in the field of fast breeder reactor safety analysis, where he contributed to the development of models of whole core accident. In 1983 he moved to the System Engineering and Reliability Division of JRC, Ispra, where he joined the group involved in the development and assessment of probabilistic risk assessment (PRA) methodologies. Currently, he is responsible for the development of a system response analyzer directly related to such methods as well as new simulation techniques. **A. Amendola** (top) (Dr. Ing., electronic engineering, University of Naples, Italy, 1962) worked for the fast breeder project at Kernforschungszentrum Karlsruhe (KfK) from 1967 to 1972, and subsequently at ENEA, Bologna, Italy (1972 to 1978). At KfK he developed probabilistic methods for the treatment of hot spot/hot channel occurrences in nuclear reactor cores. In 1978 he joined the System Engineering and Reliability Division at JRC, Ispra, where he has been involved in development and assessment of PRA methods and procedures. Currently, he is the coordinator of the research area "accident prevention" for the JRC research program in industrial risk. **G. Cojazzi** (bottom) (Dr. Ing., nuclear engineering, Politecnico di Milano, Italy, 1984) worked at the Nuclear Engineering Institute, Politecnico of Milano, in the field of nuclear reactor noise. He is currently working for a PhD degree at the Department of Energetics at Politecnico of Milano.



RADIOACTIVE WASTE MANAGEMENT

IN SITU INVESTIGATIONS ON THE IMPACT OF HEAT PRODUCTION AND GAMMA RADIATION WITH REGARD TO HIGH-LEVEL RADIOACTIVE WASTE DISPOSAL IN ROCK SALT FORMATIONS

T. Rothfuchs



T. Rothfuchs (Diplom, geophysics, Technical University Clausthal-Zellerfeld, Federal Republic of Germany, 1976) joined the Gesellschaft für Strahlen- und Umweltforschung München, Institut für Tieflagerung, in 1976 and is currently group leader and project manager for underground experiments simulating nuclear waste disposal at the Asse Salt Mine. The experiments performed by his working group focus on the investigation of integral nuclear waste/host rock interactions.

MATERIALS

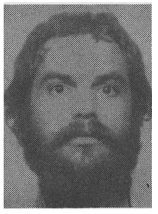
OXIDATION OF UO_2 BY HIGH-PRESSURE STEAM

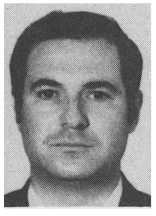
D. R. Olander

D. R. Olander (ScD, chemical engineering, Massachusetts Institute of Technology, 1958) is a professor of nuclear engineering at the University of California, Berkeley and principal investigator at the Materials and Molecular Research Division of the Lawrence Berkeley Laboratory. His research and professional interests are in the fields of reactor fuel element materials and chemistry and the chemical kinetics of gas/solid reactions.

MOMENTS ANALYSIS METHOD FOR THE DETERMINATION OF DIMENSIONS FROM RADIOGRAPHS

Yossi Bushlin
Dov Ingman
Amos Notea

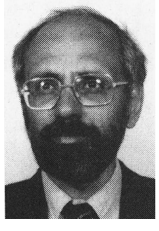




Yossi Bushlin (top) (BA, physics, 1982, and MSc, nuclear engineering, 1985, Technion, Israel) is presently pursuing his PhD in the Department of Nuclear Engineering where he also works as an instructor. His present research is in the area of digital radiography. **Dov Ingman** (center) (PhD, Laboratory of Applied Nuclear Physics, Institute of Solid Fuel Materials, Moscow) presently works in the areas of nuclear gauging, nondestructive testing, reliability, random processes, and neutron physics. **Amos Notea** (bottom) (PhD, nuclear science, Hebrew University, Jerusalem) is a professor and head of the nondestructive evaluation laboratory for Technion in Haifa, Israel. He is currently working on quantitative three-dimensional radiography for industrial applications.

ON FARMER'S LINE, PROBABILITY DENSITY FUNCTIONS, AND OVERALL RISK

Hector A. Munera
George Yadigaroglu



Hector A. Munera (top) (BSc, chemical engineering, University of Antioquia, Medellin, Colombia, 1966; MSc, radiation studies, Surrey University, Guildford, England, 1971; MSc, systems engineering, National University, Bogota, Columbia, 1974; PhD, nuclear engineering, University of California, Berkeley, 1978) was a visiting scientist at the Nuclear Engineering Laboratory of the Swiss Federal Institute of Technology in Zurich (ETHZ) during 1984 and 1985. Currently, he is with Tecnicontrol in Bogota, Colombia, where he is engaged in consulting activities. He has done extensive research on the foundations of nondeterministic decision making, where he has developed an axiomatic alternative theory. **George Yadigaroglu** (Dipl.-Ing., mechanical engineering, Ecole Polytechnique Fédérale, Lausanne, Switzerland, 1962; ScD, nuclear engineering, Massachusetts Institute of Technology, 1970) is professor of nuclear engineering at ETHZ. He was previously professor at the University of California, Berkeley, and from 1979 to 1982 he also served as head of the Nuclear Regulatory Service of the Greek Atomic Energy Commission. His research is centered around reactor safety with special emphasis on thermal hydraulics as well as probabilistic methods.