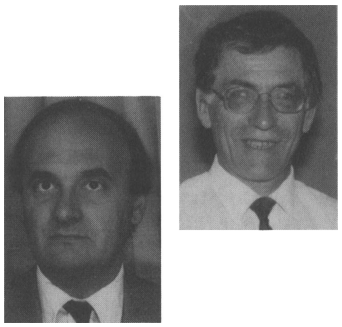
nuclear technology®

AUTHORS — MARCH 1990

FISSION REACTORS

THE COMPUTER-AIDED DESIGN SYSTEM USED FOR THE DESIGN OF THE CHOOZ B NUCLEAR POWER PLANT CONTROL SYSTEM

P. Bacher
G. Beltranda

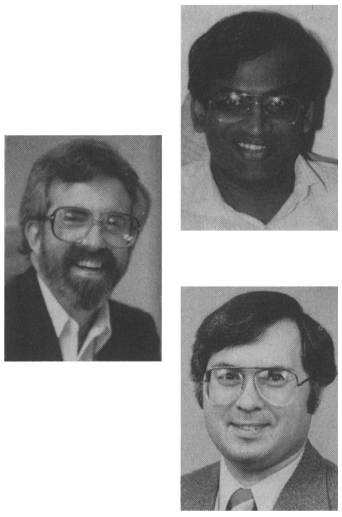


P. Bacher (top) (Ecole Polytechnique, France, 1954) is the technical director of the Engineering and Construction Division of Electricité de France (EdF). **G. Beltranda** (PhD, nuclear physics, Université des Sciences de Grenoble, France, 1974) joined EdF's Engineering and Construction Division in 1983, where he is responsible for man/machine interface studies. He previously worked on the protection system and process computers for the Superphénix fast breeder reactor.

NUCLEAR SAFETY

AN INTEGRATED OPERATOR ADVISOR SYSTEM FOR PLANT MONITORING, PROCEDURE MANAGEMENT, AND DIAGNOSIS

Rajiv Bhatnagar
Don W. Miller
Brian K. Hajek
John E. Stasenko



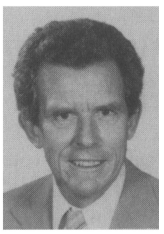
Rajiv Bhatnagar (top) [BS and MS, mechanical engineering, Indian Institute of Technology-Kanpur, India; MS and PhD, nuclear engineering, The Ohio State University (OSU), 1989] is a research scientist with the Center for Space Research at the Massachusetts Institute of Technology. His current research interests are in application of artificial intelligence (AI) to improve the operation of complex systems. He has completed research in thermal hydraulics and was employed as an engineer with Bharat Heavy Electrical. **Don W. Miller** (center) (BS, physics, Miami University, 1964; PhD, nuclear engineering, OSU, 1971) is currently a professor and chair of the nuclear engineering program at OSU. His primary areas of interest are nuclear instrumentation, measurement, control, and application of artificial intelligence in nuclear engineering. **Brian K. Hajek** (bottom) (MS, nuclear engineering, OSU, 1972) is a research

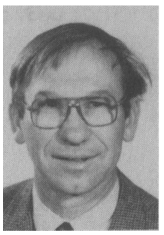
scientist and a member of the Nuclear Engineering Program faculty at OSU. His background includes nuclear plant operations and reactor operator training and licensing. His research interests include applying AI techniques to methods of aiding plant operators in the performance of their operational responsibilities and the verification and validation of expert systems. He has held two SRO licenses on research reactors and was a certified operator licensing examiner on boiling water reactors for the U.S. Nuclear Regulatory Commission. **John E. Stasenko** (no photograph available) (BS, physics and mathematics, University of Pittsburgh; MS, nuclear engineering, OSU, 1988) is employed as a design engineer at Knolls Atomic Power Laboratory where his research interests are in reactor design. His interests include the application of AI to assist nuclear plant operators in improving their performance.

CHEMICAL PROCESSING

RAPID SIMULATION OF CONCENTRATION PROFILES IN PULSED COLUMN CONTACTORS USING THE PUREX PROCESS

John F. Geldard
Adolph L. Beyerlein

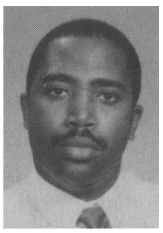


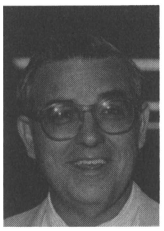


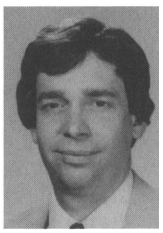
John F. Geldard (top) (BSc, 1958, and MSc, 1959, chemistry, University of Sydney, Australia; PhD, organic chemistry, University of Sydney, Australia, 1964) is a professor of chemistry at Clemson University. His research interests include transition metal chemistry, molecular dynamical studies of rearrangements of small inorganic molecules by nondissociative pathways, and the mathematical modeling of nuclear reprocessing. **Adolph L. Beyerlein** (BS, chemistry, Fort Hayes Kansas State College, 1960; PhD, physical chemistry, University of Kansas, 1966) is a professor of chemistry at Clemson University. His areas of interest are theoretical chemistry, transport phenomena, thermal diffusion, and nuclear reprocessing.

AN INCINERATOR ASH DISSOLUTION MODEL FOR THE SYSTEM: PLUTONIUM OXIDE, NITRIC AND HYDROFLUORIC ACIDS

Eric V. Brown
Leonard W. Gray
D. William Tedder







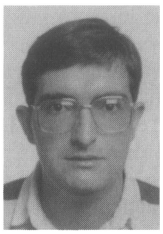
Eric V. Brown (top) (BS, chemical engineering, Clemson University, 1986; MS, chemical engineering, Georgia Institute of Technology, 1988) is a project engineer for CH2M in Atlanta, Georgia, where he works in the industrial processes group. **Leonard W. Gray** (center) (BS, chemistry, New Mexico Institute of Mining Technology, 1964; MS, chemistry, Texas Technological College, 1967; PhD, organic chemistry, University of South Carolina, 1972) is a section leader in isotope separation and materials processing at Lawrence Livermore National Laboratory. His research interests include plutonium processing chemistry with both aqueous and molten salt systems. **D. William Tedder** (bottom) (BChE, Georgia Institute of Technology, 1972; MS, 1973, and PhD, 1985, chemical engineering, University of Wisconsin) is a faculty member in the School of Chemical Engineering at Georgia Institute of Technology. His research areas include computer modeling, process synthesis, waste management, and chemical separations by liquid/liquid extraction.

NUCLEAR FUELS

THE BACK END OF THE NUCLEAR FUEL CYCLE: TECHNICAL AND ECONOMIC ANALYSIS—PART I: ONCE-THROUGH CYCLE

THE BACK END OF THE NUCLEAR FUEL CYCLE: TECHNICAL AND ECONOMIC ANALYSIS—PART II: COMPARISON OF CYCLES

Jordi Roglans-Ribas
Bernard I. Spinrad

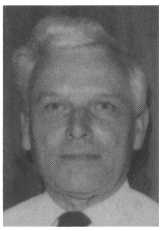


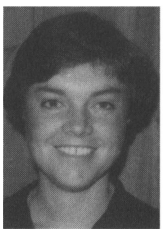
Jordi Roglans-Ribas (top) (BS, energy engineering, Poltechnical University of Barcelona, Spain, 1982; MS, 1984, and PhD, 1987, nuclear engineering, Iowa State University) has worked in the Reactor Analysis and Safety Division of Argonne National Laboratory since 1987. His main interests are reactor safety for liquid-metal reactors and radioactive waste disposal. **Bernard I. Spinrad** (PhD, chemistry, Yale University, 1945) is professor and chair of the nuclear engineering department at Iowa State University.

RADIOACTIVE WASTE MANAGEMENT

DISSOLUTION MODEL FOR A GLASS HAVING AN ADHERENT INSOLUBLE SURFACE LAYER

Keith B. Harvey
Carol A. B. Larocque



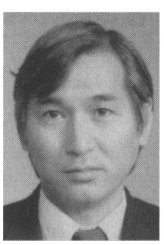


Keith B. Harvey (top) (BSc, physics and mathematics, University of London, United Kingdom; PhD, solid state physics, University of Bristol, United Kingdom) has been employed since 1979 by Atomic Energy of Canada Limited (AECL) at the Whiteshell Nuclear Research Establishment (WNRE), where he is involved in development of durable glass compositions for the immobilization of high-level reprocessing wastes, testing methods, and descriptive models. He has recently been researching new processes for the treatment and disposal of nonnuclear hazardous wastes. **Carol A. B. Larocque** (BSc, biology, University of Western Ontario, Canada, 1982) has been with AECL since 1982 at the WNRE, where she has been involved in the development of durable glass compositions for the immobilization of high-level reprocessing wastes. More recently, she has been studying the diffusion of hydrogen in the Zr/2.5% Nb alloys used in the manufacture of Canada deuterium uranium (CANDU) reactor pressure tubes.

MATERIALS

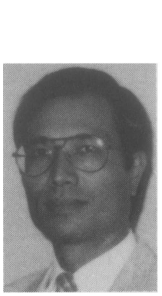
AN ALKALINE PREFILMING PROCESS FOR THE PRIMARY PIPING IN A NEW JAPANESE BOILING WATER REACTOR

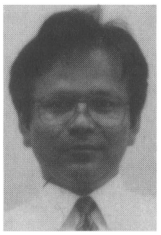
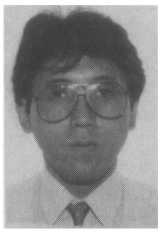
Takashi Honda
Katsumi Ohsumi
Motohiro Aizawa
Kiichiro Takagi
Osamu Amano
Kazuhiko Yamashita



Takashi Honda (right) (BS, electrochemical engineering, Yokohama National University, Japan, 1973; PhD, nuclear engineering, University of Tokyo, Japan, 1986) is a senior researcher at Hitachi Research Laboratory, Hitachi, Ltd. Since 1973, his general field of interest has been metal corrosion. His recent interests include the water chemistry of nuclear power plants. **Katsumi Ohsumi** (left) (BS, 1970, and PhD, 1988, nuclear engineering,

Osaka University, Japan) is a senior engineer at Hitachi Works, Hitachi, Ltd. Since 1970, he has been engaged in chemical and radiological engineering. **Motohiro Aizawa** (top right) (MS, applied chemistry, Iwate University, Japan, 1981) is an engineer at Hitachi Engineering Company. He has been involved in the water chemistry engineering of boiling water reactors. **Kiichiro Takagi** (top left) (MS, nuclear engineering, Tohoku University, Japan, 1971) is an associate researcher at the Nuclear Power Research and Development Center, Tokyo Electric Power Company. He has worked in the fields of radiation protection and uranium enrichment. **Osamu Amano** (bottom right) (MS, nuclear engineering, Tohoku University, Japan, 1977) is an assistant manager in the nuclear power plant operation and maintenance department, Tokyo Electric Power Company. He has worked in the field of water quality control and radioactive waste treatment for light water reactors. **Kazuhiko Yamashita** (bottom left) (MS, nuclear engineering, Tokyo Institute of Technology, Japan, 1982) is currently in the nuclear power construction department at the Tokyo Electric Power Company. He has worked in the field of nuclear power design.



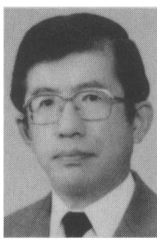
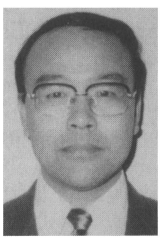
RADIOISOTOPES AND ISOTOPE SEPARATION

ENERGY CONSUMPTION FOR PRODUCT ASSAY IN A CHEMICAL ENRICHMENT PROCESS

ISOTOPIC BACKMIXING IN A LARGE-SCALE ENRICHMENT COLUMN IN A CHEMICAL ENRICHMENT METHOD

Kunihiko Takeda
Yoshikazu Nishigaki
Hatsuki Onitsuka

Kunihiko Takeda (top) (BS, 1966, and PhD, 1986, physical chemistry, Tokyo University, Japan) has been general manager of the Asahi Chemistry Industry Uranium Enrichment Laboratory (UEL) since 1986. His interests include basic phenomena of separation processes and preparation of organic and inorganic adsorbents. **Yoshikazu Nishigaki** (center) (BS, 1967, and MS, 1969, chemical engineering, Osaka University, Japan) is manager and chief engineer in process development at UEL. His main interests are in process design and chemical reaction engineering. **Hatsuki Onitsuka** (bottom) (BS, 1970, and MS, 1972, analytical chemistry, Tokyo University, Japan) is manager and chief chemist in process development at UEL. His main interests are in separation technology and dispersion and mass transfer phenomena.

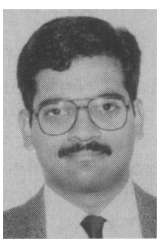




HEAT TRANSFER AND FLUID FLOW

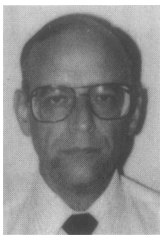
TRANSIENT CONDENSATION IN THE PRESENCE OF NONCONDENSABLES AT A VERTICAL WALL

Suresh V. Garimella
Richard N. Christensen

Suresh V. Garimella (right) (BTech, mechanical engineering, Indian Institute of Technology, India, 1985; MS, mechanical engineering, Ohio State University, 1986) is a doctoral candidate in mechanical engineering at the University of California, Berkeley. His research interests include condensation of multicomponent mixtures, liquid cooling of electronic components, and



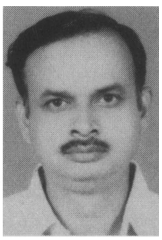
thermal conductivity of packed beds. **Richard N. Christensen** (right) (BS, physics, Brigham Young University, 1968; MS, mechanical engineering, and PhD, nuclear engineering, Stanford University) is currently an associate professor in the nuclear engineering program at Ohio State University. His current research areas include enhanced heat transfer, two-phase flow and heat transfer, condensation in the presence of a noncondensable, heat transfer in nuclear waste repositories, and inherently safe reactors.

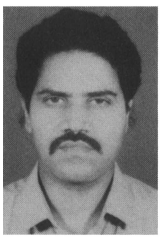


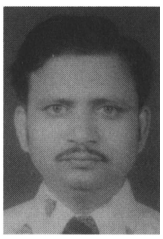
TECHNIQUES

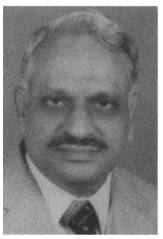
CONTROLLED POTENTIAL COULOMETRIC DETERMINATION OF PLUTONIUM IN MIXED (U,Pu) CARBIDE FUELS

Har Swroop Sharma
Nandakumar B. Khedekar
Surendranath G. Marathe
Hem Chand Jain









Har Swroop Sharma (top right) (D. Phil., chemistry, University of Allahabad, India, 1976) has performed polarographic studies of coordination compounds. He joined Bhabha Atomic Research Center (BARC), Bombay, in 1978 and is working on the analytical and separation chemistry of actinides mainly involving electroanalytical and ion-exchange techniques. **Nandakumar B. Khedekar** (top left) (BS, University of Poona, India, 1977) joined BARC in 1980. He is working on the analytical chemistry of uranium and plutonium. **Surendranath G. Marathe** (bottom right) (PhD, chemistry, University of Poona, India, 1968) joined BARC in 1967. He has worked in the areas of nuclear fission, on-line analytical instrumentation, and radioanalytical chemistry. He is currently leading a group working on the chemical quality control of nuclear fuels. **Hem Chand Jain** (bottom left) (PhD, chemistry, Bombay University, India, 1971) joined BARC in 1962 and worked on fission and solution chemistry of actinides. His areas of interest are mass spectrometry, alpha spectrometry, radioanalytical chemistry, and application of these in nuclear technology. He is head of the Mass Spectrometry Section, Fuel Chemistry Division, BARC.