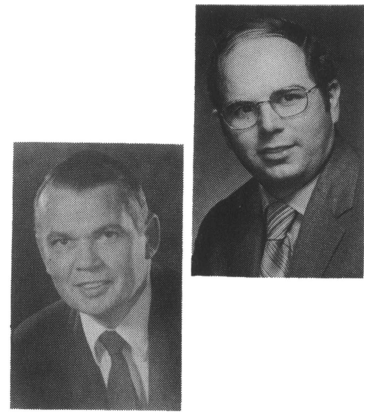
nuclear technology

AUTHORS — SEPTEMBER 1972

REACTORS

BURNUP AND POWER SHIFT EFFECTS IN LARGE FAST BREEDER REACTORS

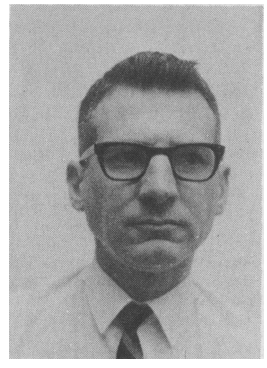
J. S. Philbin
R. A. Axford



J. S. Philbin (top) (PhD, nuclear engineering, University of Illinois, 1971) is a staff member in the Reactor Source Applications Division of Sandia Laboratories, Albuquerque, New Mexico. He is presently engaged in operational and research projects associated with the fast burst reactor facility at Sandia. Roy A. Axford (PhD, nuclear engineering, Massachusetts Institute of Technology, 1958) is a professor of nuclear engineering at the University of Illinois at Urbana-Champaign. His current research interests include optimal programming techniques for reactor statics, for reactor control, for optimal synthesis in reactor design, and for nuclear fuel management.

THE DETERMINATION OF RATIOS OF EFFECTIVE CROSS SECTIONS FROM MEASURED BURNUP DATA FOR YANKEE ROWE

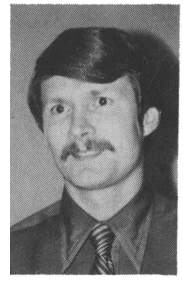
R. P. Matsen



R. P. Matsen (PhD, physics, University of California, Berkeley, 1961) began work in the area of reactor physics when he joined Battelle-Northwest in 1965. He has done considerable work in the area of destructive analysis of reactor fuels, the development of improved methods of deducing parameters from the data, and applying these methods to available data.

SPACE-ENERGY-DEPENDENT PHYSICS PROBLEMS OF PLUTONIUM FUELS IN HTGRs

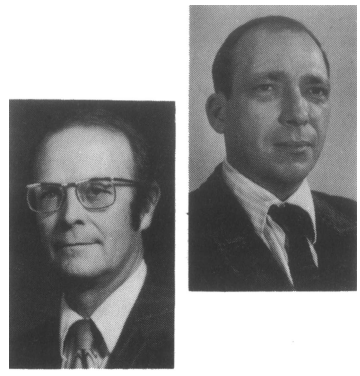
Keith E. Asmussen
Paul Wälti



Keith E. Asmussen (top) (PhD, nuclear engineering, Iowa State University of Science and Technology, 1969) has been with the Nuclear Analysis and Reactor Physics Group at Gulf General Atomic since 1969. Currently, his primary interests are in plutonium utilization, fuel management, and the physics of resonance self shielding in heterogeneous systems. Paul Wälti (PhD, physics, Swiss Federal Institute of Technology, 1968) spent a year as a post-doctoral fellow at the University of California, Berkeley. He then joined the Nuclear Analysis and Reactor Physics Group at Gulf General Atomic in 1969, where his main interest was in space-energy-dependent flux spectrum codes. He is currently with the data processing department of the F. Hoffman-La Roche Company in Basel, Switzerland.

VAPOR TRANSPORT LIMITS OF LIQUID METAL HEAT PIPES

Don W. DeMichele
Monte V. Davis



Don W. DeMichele (top) (PhD, nuclear engineering, University of Arizona) is an assistant professor of industrial engineering at Texas A&M University. He is currently involved in teaching methods of engineering optimization and systems modeling. His past experience has been involved in nuclear systems analysis and optimization including analysis of heat pipe radiator systems. Monte V. Davis (PhD, physics, Oregon State University, 1956) is a professor of nuclear engineering at the University of Arizona. Currently, his interests are in applications of high temperature material to nuclear and thermonuclear systems, direct energy conversion, and utilization of heat at high temperature.

EVALUATION OF ABSORBER MATERIALS PERFORMANCE IN HFIR CONTROL CYLINDERS

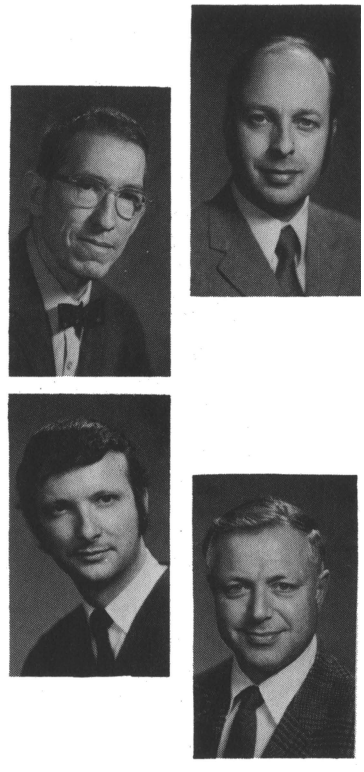
R. W. Knight
A. E. Richt

R. W. Knight (top) (BS, physics, Hamline University, 1946) is a staff engineer with the Powder Metallurgy Group, Oak Ridge National Laboratory. Before joining ORNL in 1954, he was a design engineer with Portsmouth Naval Shipyard. A. E. Richt (BS, metallurgical engineering, University of Cincinnati, 1952) is a staff metallurgist with the Remote Metallography Group, ORNL, and has specialized in evaluation of the performance of fuel and absorber materials since 1952.

CHEMICAL PROCESSING

THE CONTAINMENT OF FISSION PRODUCT IODINE IN THE REPROCESSING OF LMFBR FUELS BY PYROCHEMICAL REACTIONS

M. Krumpelt
J. J. Heiberger
V. A. Maroni
M. J. Steindler

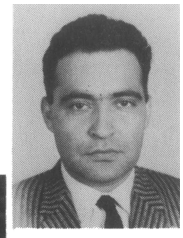


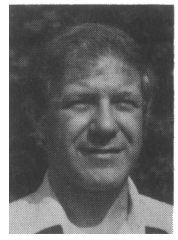
Michael Krumpelt (top left) (PhD, University of Braunschweig, 1966) has participated in the development of a pyrochemical reprocessing method for LMFBR fuels at the Chemical Engineering Division of Argonne National Laboratory. Currently, he is investigating the electrolytic reduction of plutonium for a Purex-process application. John J. Heiberger (top right) (BS, St. Procopius College, 1962) joined the Chemical Engineering Division of ANL in 1963 and was involved in the field of pyrochemical reprocessing of nuclear fuels. More recently he has worked in reprocessing-related aqueous chemistry of plutonium. Victor A. Maroni (bottom left) (PhD, Princeton University, 1967) has been a member of the Chemical Engineering Division of ANL since 1967. His past work involved studies of the structure of molten salts by spectroscopic methods. Recently his activities have included a variety of physicochemical investigations of liquid metal and molten salt systems of interest to controlled thermonuclear research. Martin J. Steindler (bottom right) (PhD, University of Chicago, 1952) is a group leader for process chemistry in the Chemical Engineering Division of ANL. He has been active in nonaqueous reprocessing of nuclear fuels and is currently involved in this and other parts of the nuclear fuel cycle.

FUELS

NEUTRON RADIATION CHARACTERISTICS OF PLUTONIUM DIOXIDE FUEL

Mojtaba Taherzadeh
Peter J. Gingo

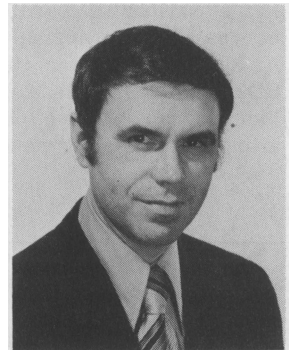




M. Taherzadeh (top) (PhD, physics, University of California, Los Angeles, 1964), associated with Jet Propulsion Laboratory/Cal Tech since 1969, is a project leader and a member of the technical staff in charge of analytical research in determination of radiation characteristics of nuclear power sources. He is also responsible for radiation interference studies with regard to the scientific instruments aboard the spacecraft. Prior to 1969, Taherzadeh was with EG&G as a scientific specialist. In this capacity he was responsible for nuclear radiation hardening and higher power electron beam design for the simulation of electromagnetic pulses. P. J. Gingo (PhD, engineering physics, University of California, Los Angeles, 1966) is an associate professor at the University of Akron. He has extensive experience in the mathematical modeling of physical systems.

CORRELATION OF IRRADIATION DATA USING ACTIVATION FLUENCES AND IRRADIATION TEMPERATURE

John H. Lynch

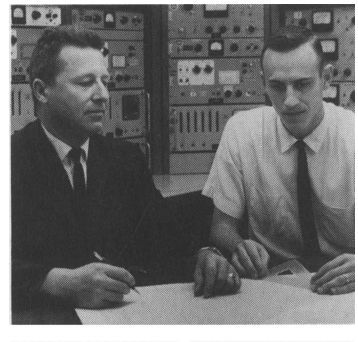


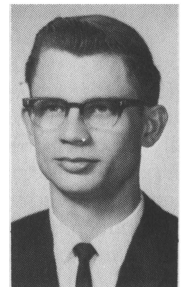
John Lynch (MS, engineering science, University of Toledo, 1966) is employed at the Plum Brook Reactor Facility of NASA Lewis Research Center. He has published papers in *Nuclear Technology* and other journals, on heat transfer, shielding, reactor physics, applied statistics, and experiment design. He is currently involved in general nuclear analysis and design of experiment environments and is interested in the correlation of chronic diseases with air pollutants and in optimization techniques.

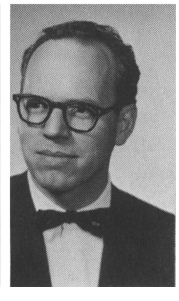
RADIOISOTOPES

SUBCRITICAL MULTIPLICATION OF CALIFORNIUM-252 NEUTRONS AND ITS APPLICATIONS

E. D. Clayton
L. E. Hansen
N. A. Wogman
R. W. Perkins





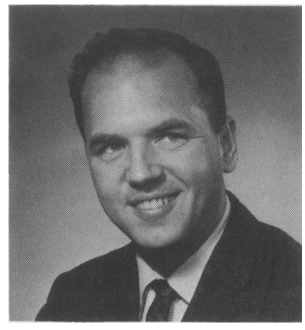


Leo E. Hansen (top right) (BS, nuclear engineering, Kansas State University, 1965), a research engineer at Battelle's Pacific Northwest Laboratories, is primarily responsible for performing analytical evaluations of Pu and mixed Pu-U criticality data and for the analysis of criticality safety problems. E. Duane Clayton (top left) (BA, mathematics and physics, Whitman College, 1947; PhD, physics, University of Oregon, 1952) is manager of the PNL Criticality Research and Analysis Section and associate professor in the University of Washington's Department of Nuclear Engineering. He is responsible for Hanford critical mass studies with Pu and mixed Pu-U systems. N. A. Wogman (bottom left) (PhD, chemistry, Purdue University, 1966) has management responsibility for numerous research programs which involve the measurement of very minute amounts of radionuclides in environmental samples. R. W. Perkins (bottom right) (MS, chemistry, Utah State University, 1952), manager of radiological chemistry at PNL, pioneered the development of high sensitivity gamma-ray spectrometry and is principal investigator for an Apollo lunar sample studies program.

NUCLEAR EXPLOSIVES

PREDICTION OF UNDERGROUND NUCLEAR EXPLOSION EFFECTS IN WAGON WHEEL SANDSTONE

Robert W. Terhune

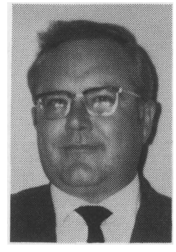


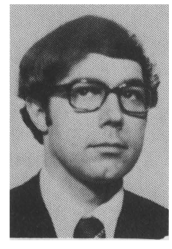
R. W. Terhune (MS, applied science, University of California, Davis at Livermore, 1967) is a physicist at Lawrence Livermore Laboratory. His recent research has been in surface motion measurement for cratering experiments and stress wave propagation in earth media.

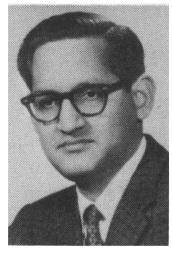
AEROSPACE

NERVA FLIGHT ENGINE CONTROL SYSTEM DESIGN

H. H. Norman
E. A. Parziale
J. K. Saluja
R. F. Schenz, Jr.





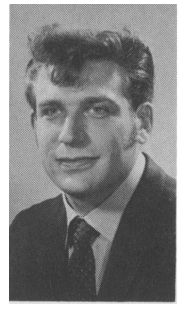


H. H. Norman (top left) (MS, nuclear engineering, Carnegie-Mellon University, 1963) is now with the Westinghouse Transportation Division on the Bay Area Rapid Transit Project. He has worked on the NERVA Nuclear Rocket Program for Westinghouse Astronuclear Laboratory since 1961, and was most recently supervisor of the joint Westinghouse-Aerojet Controls Analysis Group which developed the NERVA control system design. Ernest A. Parziale (top right) (MS, electrical engineering, Columbia University, 1968) is presently with the Nuclear Energy Systems Division of Westinghouse in Pittsburgh and has spent the past three years working on the NERVA Nuclear Engine Program for the Astronuclear Laboratory of Westinghouse. On the NERVA program he contributed to the functional design of the digital control system, using state variable feedback techniques. J. K. Saluja (bottom left) (PhD, nuclear engineering, University of Florida, 1966) is a senior engineer with the Westinghouse Astronuclear Laboratory, working on the NERVA program and in the Controls Design and Analysis Group. He is presently with the PWR Division of Westinghouse Nuclear Energy Systems. R. F. Schenz (bottom right) (MS, electrical engineering, University of California at Davis, 1970) is a member of the Controls Analysis Group on the NERVA program.

ANALYSIS

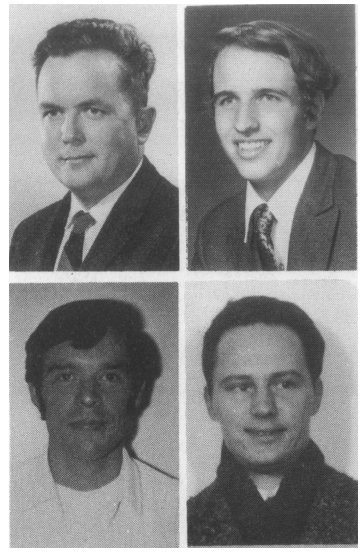
NONDESTRUCTIVE ASSAY OF POWER REACTOR FUEL ASSEMBLIES

C. R. Weisbin
R. H. Augustson
J. S. Hendricks
A. E. Evans
G. D. Turner
K. D. Böhnel



Charles R. Weisbin (left) (Eng ScD, nuclear engineering, Columbia University, 1969) was active in the calculational program connected with the LASL Safeguards Program from 1970-71. His current technical interests include compilation, evaluation, and processing of data for neutron, photon, and charged particle transport. Ronald H. Augustson (right) (PhD, physics, Rensselaer Polytech-

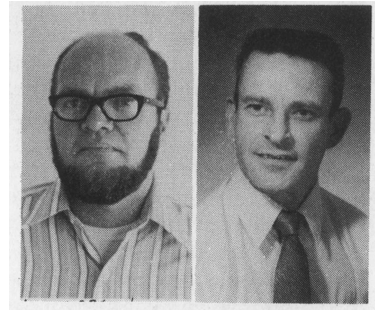
nic Institute, 1967) and Albert E. Evans (top left) (PhD, physics, University of Maryland, 1965) are members of the LASL Safeguards Group concerned with the development of nondestructive assay technology. John S. Hendricks (top right) (MS, nuclear engineering, UCLA, 1972) participated in the reported work while a summer research assistant at LASL. He is currently an NSF graduate fellow at Massachusetts Institute of Technology. Garland D. Turner (bottom left) (MS, physics, University of New Mexico, 1969) is a member of the Theoretical Design Division at LASL whose present interests include the Monte Carlo calculational methods of neutron transport used extensively in the present work. Klaus D. Böhnel (bottom right) (MS, Technische Hochen Munchen, 1964) took an active part in the development of this measurement technique while a visiting scientist at LASL in 1971. He is currently extending the technique to include the use of radioactive sources in the research program at the Kernforschungszentrum, Karlsruhe, Germany.



REACTORS

ON-LINE REACTIVITY FEEDBACK ANALYSIS OF EBR-II BY ROD DROP

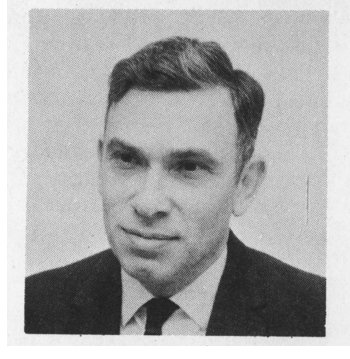
H. A. Larson
I. A. Engen



H. A. Larson (left) (PhD, University of Washington, 1971) is a staff member of Argonne National Laboratory's EBR-II project, working in the area of reactor analysis. His current interests involve reactor dynamics. I. A. Engen (MS, University of Idaho, 1970), also a staff member of the EBR-II project, is working in the area of computer applications. Currently his interests concern reduction of experimental data and operational support.

CROSS FLOW RESISTANCE IN ROD BUNDLE CORES

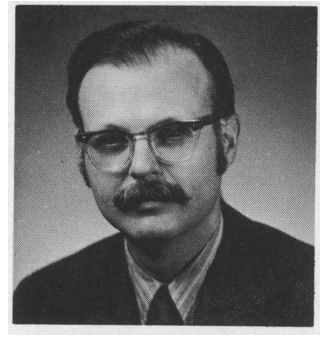
Joel Weisman



Joel Weisman (PhD, University of Pittsburgh) is an associate professor of nuclear engineering at the University of Cincinnati. Prior to joining UC, he spent 13 years at Westinghouse PWR Systems Division where his last position was as manager of Thermal and Hydraulic Analysis. Weisman is coauthor of the ANS monograph *Thermal Analysis of Pressurized Water Reactors*. His current research includes studies of two-phase pressure drop and heat transfer, boiling transients, and core design techniques.

BREEDING RATIO, INVENTORY, AND DOUBLING TIME IN A D-T FUSION REACTOR

W. F. Vogelsang



William F. Vogelsang (PhD, physics, University of Pittsburgh) is an associate professor of nuclear engineering at the University of Wisconsin. He has worked with critical assemblies and neutron diffraction. His current research interests are in the fueling, tritium handling, and safety problems of fusion reactors.