NUCLEAR APPLICATIONS & TECHNOLOGY

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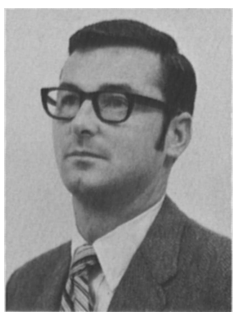
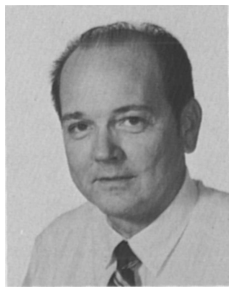


Ed Fuller (BA, physics, San Jose State College and MS, nuclear engineering, Stanford University) is presently core and fuel specialist, proposal engineering, in General Electric's Atomic Power Equipment Department. He has been with the Nuclear Energy Division for 10 years with various responsibilities for nuclear methods, conceptual design of nuclear fuel, and analysis of operating nuclear fuel. During the writing of this paper, his responsibility was for in-service analysis of all General Electric-built nuclear fuel. This included specifying in-core fuel management plans and post-operation nuclear evaluation of each of the operating GE/BWR's.

Allan F. McFarlane (PhD, University of Glasgow, Scotland) is a manager of nuclear engineering, Westinghouse PWR Systems Division. His group is responsible for the nuclear design of the initial cores for Westinghouse commercial pressurized water reactors.

C. A. Flanagan has been active in all aspects of nuclear design, analysis, and operational follow of Bettis-designed cores since 1956. Much of this time has been with the Shippingport cores. Currently he is manager of a group responsible for the nuclear, thermal-hydraulic, and reactor protection analysis for an advanced core design for the nuclear navy.



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W. E. Graves

William E. Graves (PhD, University of Indiana, 1955) has been a physicist at the Savannah River Laboratory since 1955, dividing his time between experimental and computational efforts. He is presently supervising a group working in the area of reactor theory and calculations.

AVERAGE THERMAL NEUTRON CAPTURE CROSS SECTIONS OF ^{198}Au, ^{65}Ni, AND ^{66}Cu 662

V. Serment, A. Abu-Samra, A. H. Emmons

Vinicio Serment (left) (PhD, nuclear engineering, University of Michigan, 1961) is a professor in the Physics Department of the Faculty of Science of the Universidad Nacional Autónoma de México and works in the Power Reactor Program of the Comisión Nacional de Energía Nuclear of Mexico. His research interests are in neutron cross-section measurements and reactor safety. He was a visiting professor at the Research Reactor Facility of the University of Missouri during 1969. A. H. Emmons (not pictured) (PhD, University of Michigan, 1960) is a professor of nuclear engineering and radiological sciences and is director of the Research Reactor Facility at the University of Missouri at Columbia. Adel Abu-Samra (right) (MS, nuclear engineering, Iowa State University, 1964) is currently with the Nuclear Science Group of the Research Reactor Facility of the University of Missouri. He has research interests in activation analysis, radiochemical separations, and isotope applications.

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SPONTANEOUS DEPOSITION OF POLONIUM-210 FROM CHLORIDE SOLUTION 667

C. H. H. Chong, M. D. Prisc

C. H. H. Chong (right) (PhD, Michigan State University, 1958) is a research specialist in the Development Section of the Nuclear Operation Department of Monsanto Research Corporation, Mound Laboratory. His current interest centers on alpha-emitting nuclides. M. D. Prisc (BS, Parsons College, 1966) is a development chemist for the Nuclear Operation Department of Monsanto Research Corporation, Mound Laboratory. He is currently investigating production and characterization of nuclear materials.

FUELS

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R. D. Leggett, R. K. Marshall, C. R. Hann, C. H. McGilton

R. D. Leggett (center) (PhD, Carnegie Institute of Technology) was manager of the Metal Fuels Unit when the "Hollow-Rod" experiment was conducted. He is now a research associate with the FFTF project studying the irradiation performance of mixed-oxide (UO_2-PuO_2) fuel. Robert K. Marshall (right) (BS, chemistry, Washington State University) is active in the field of irradiation testing. He is currently engaged in the design of fuels for commercial power reactors. C. H. McGilton (not pictured) (BS, metallurgical engineering, Utah University) was test engineer at the ETR, NRTS, during the experiment. He is now involved with a Navy prototype training program. C. R. Hann (left) (BS, metallurgical engineering, South Dakota School of Mines and Technology) has a background in the irradiation performance of fuel materials. His current interests include the mixed-oxide (UO_2-PuO_2) and silicide fuels.

SINGLE- AND TWO-PHASE PRESSURE DROPS ON A 16-ROD BUNDLE 682

P. Grillo, V. Marinelli

Valerio Marinelli (left) (PhD, nuclear engineering, Politecnico di Torino) is a senior researcher in thermal hydraulics of light water reactors. He joined CNEN in 1969 and is now responsible for the thermohydraulic design of fuel elements for power plants in the CNEN Plutonium Program. Paolo Grillo (PhD, industrial engineering, Politecnico di Torino) is a senior designer of cores for nuclear plants. He joined CNEN in 1966 and is now head of fuel design in the CNEN Plutonium Program.

THE APPLICATION OF RELIABILITY MARGIN ANALYSIS TO FUEL ELEMENT PERFORMANCE 694

C. W. Sayles

C. W. Sayles (BS, University of Oklahoma, 1959; PhD, Iowa State, 1964) is a member of the technical staff of the Atomic International Division of North American Rockwell. For the past four years, he has worked with fuel assembly and core design of AI's Fast Breeder Reactor.

HELIUM PRODUCTION IN EBR-II IRRADIATED STAINLESS STEEL 700

N. D. Dudey, S. D. Harkness, H. Farrar, IV

N. D. Dudey (top left) is the group leader of the Cross Section Group in the Chemical Engineering Division at Argonne National Laboratory. His work is directed toward the fast breeder reactor program in the areas of cross-section measurements, nuclear reaction studies, and fast-neutron dosimetry. S. D. Harkness (right) is a member of the Cladding and Analysis Group in the Materials Science Division at Argonne National Laboratory. His work has been centered in fast-neutron irradiation damage and studies of void formation in metals in support of the Fast Breeder Reactor Program. Harry Farrar, IV (bottom left) is on the technical staff at Atomics International where he is applying a high sensitivity gas mass spectrometer system to measure extremely small amounts of helium in metals to determine integrated (n,α) cross sections.

RATE CONTROLLING FACTORS IN THE CARBOTHERMIC SYNTHESIS OF ADVANCED FUELS 711

T. B. Lindemer

T. B. Lindemer (PhD, metallurgical engineering, University of Florida, 1966) has been a member of the Metals and Ceramics Division at Oak Ridge National Laboratory, Oak Ridge, Tennessee since December 1966. His main interests are kinetics of gas-solid and solid-solid chemical reactions during synthesis of nuclear fuels.

MATERIALS

FLOWING SODIUM CAPSULES IN THE GETR 716

D. L. Brown, G. W. Tunnell

Donald L. Brown (left) (MSME, Stanford University, 1966) joined the General Electric Company's Irradiation Processing Operation in 1962, where he was involved in the development and implementation of computerized methods for the thermal and hydraulic analysis of irradiation experiments and reactor systems, and the design of irradiation experiments. Since 1969, he has been working in the area of thermal and hydraulic analysis for reactor safety studies with the General Electric Company Breeder Reactor Development Operation. G. W. Tunnell (MS, University of Wales) has been with General Electric Company's Irradiation Processing Operation since 1968, during which time he has designed experiments and equipment related to testing of LMFBR fuel in water reactors. He is currently working on loss-of-flow experiments with these fuels.

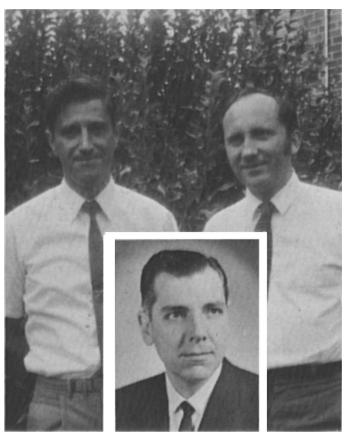
AEROSPACE

INTERACTIONS BETWEEN RADIATION FIELDS FROM RADIOISOTOPE THERMOELECTRIC GENERATORS AND SCIENTIFIC EXPERIMENTS ON SPACECRAFT

C. G. Miller, V. C. Truscello

Charles G. Miller (left) (PhD, University of California at Berkeley, 1949) is a member of the technical staff of Jet Propulsion Laboratory, where his research interests are in environmental simulation of nuclear and space radiation. Vincent C. Truscello (PhD, University of Maryland, 1966) is a supervisor of the Nuclear Power Sources Group at Jet Propulsion Laboratory. His interests are in design, analysis, integration, and testing of radioisotope thermoelectric generators for spacecraft application.

INSTRUMENTS



A NEUTRON DETECTION SYSTEM FOR OPERATION IN VERY HIGH GAMMA FIELDS

D. P. Roux, J. T. De Lorenzo, C. W. Ricker

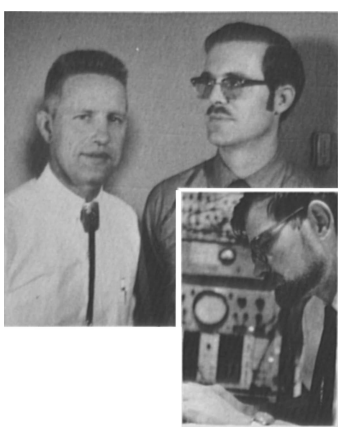
Dominique P. Roux (top right) (PhD, physics, University of Geneva, Switzerland, 1958) has been a member of the Oak Ridge National Laboratory's Instrumentation and Controls Division since 1960. He is currently in charge of the Reactor Controls Research and Development Group. Charles W. Ricker (inset) (PhD, nuclear science, University of Michigan, 1965) has been chairman of the Department of Physics at Albion College since 1965). Prior to that he was a member of the Reactor Controls Department at the Oak Ridge National Laboratory. His primary research interests are in the field of neutron fluctuation analysis. Joseph T. De Lorenzo (top left) (MS, electrical engineering, University of Pennsylvania) has been employed by ORNL for 20 years. The last 12 years have been spent with the Circuit Development Group. His primary interests are reactor control pulse-type instrumentation and fast electronics for neutron physics experiments.

EVALUATION OF A NEUTRON DETECTION SYSTEM IN A COBALT-60 FIELD OF 10^7 R/h

A. R. Buhl, N. J. Ackermann, Jr., J. T. De Lorenzo

Anthony R. Buhl (left) (PhD, University of Tennessee) is a nuclear engineer in the Instrumentation and Controls Division at the Oak Ridge National Laboratory. At ORNL he is involved in the development of a subcriticality measurement system for LMFBR's. Prior to joining ORNL, he was a group leader at the U. S. Army Nuclear Defense Laboratory and was involved in a variety of radiation transport problems. Norbert J. Akermann, Jr. (center) is also a nuclear engineer with the same division and is involved in the development of a subcriticality measurement system for LMFBR's. Joseph T. De Lorenzo (right) (see above for biographical data).

TECHNIQUES



TECHNIQUES FOR TWO-DIMENSIONAL GAMMA-RAY SCANNING OF REACTOR FUEL ELEMENT SECTIONS

B. K. Barnes, D. M. Holm, W. M. Sanders, D. D. Clinton, J. E. Swansen

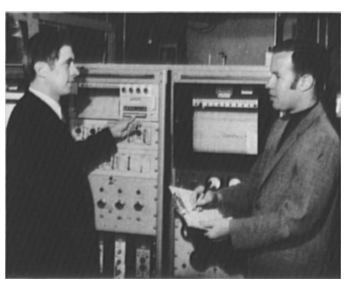
B. K. Barnes (inset) (PhD, Rice University, 1965) is an assistant professor in the Nuclear Engineering Department at Lowell Technological Institute and is a visiting staff member at Los Alamos Scientific Laboratory. Dale M. Holm (top left) (PhD, Oregon State College, 1955) and W. Mort Sanders (top right) (MS, University of New Mexico, 1966) have done work in ^{3}He, neutron, and photon activation analysis, and have extensive experience in unfolding complex gamma-ray spectra obtained from irradiated fuel elements. Both are staff members at the Los Alamos Scientific Laboratory, University of California, Los Alamos, New Mexico. Holm is currently working in biophysics on cancer-related research, and Sanders is working on instrumentation to measure the spatial, time, and energy distributions of x-ray pulses. Pictures and biographical data for D. D. Clinton and J. E. Swansen are unavailable.

Petru Popa (top left) (IAEA fellow), physicist of the Institute of Atomic Physics, Bucharest, came to Mol, Belgium, to develop experimental methods for burnup determination. Marcel De Coster (right), physicist, University of Brussels and Dieter Langela (bottom left) are members of the Reactor Physics Group of the Centre d'Etude de l'Energies Nucléaire, Mol, Belgium. They are engaged in research on neutron dosimetry and on the applications of the solid-state track detectors in reactor physics experiments.

R. S. Reynolds (right) (MS, nuclear engineering, Kansas State University, 1969) is a candidate for the PhD degree in nuclear engineering at KSU. He has supervised the experimental work at the Kansas State University Nuclear Engineering Shielding Facility for the past three years and his present research interests include the in-and-down scattering problem. N. D. Eckhoff (PhD, nuclear engineering, Kansas State University, 1968) assistant professor of nuclear engineering at Kansas State University is the director of the Neutron Activation Analysis Laboratory at KSU. His other research interests include operations research and statistical methods.

NOTES

REACTOR SITING



Ralph M. Singer (right) (PhD, chemical engineering, University of Minnesota) and Robert E. Holtz (MSME, University of Illinois) are both associate engineers in the Coolant Dynamics Section of the Reactor Analysis and Safety Division at Argonne National Laboratory. Their current interests are primarily concerned with fast reactor safety problems involving sodium boiling.

MATERIALS

J. J. Holmes (right) and A. L. Ward are manager and research engineer, respectively, of the Mechanical Metallurgy Section of WADCO's Materials Technology Department at the Hanford Engineering and Development Laboratories. Both are associated with studies related to the determination of the effects of irradiation on the mechanical properties of candidate LMFBR structural and cladding materials.

DEPARTMENTS

Corrigendum

W. Waverly Graham has advised us that Eq. (10), which appeared on p. 533 in the June, 1970 issue of *Nuclear Applications and Technology*, is in error.

The correct equation is

$$\tau_1 = \frac{N_1/N_2 - 1}{(\Sigma p_i n_i)_2 + \frac{L_2 - L_1}{N_2}} \quad .$$

The correct derivation is

$$Q = \frac{N}{\tau} + L \tag{8}$$

$$\tau = 1/\Sigma p_i n_i \quad . \tag{9}$$

From Eq. (8),

$$\tau_1 = N_{1/(Q-L_1)} \text{ and } \tau_2 = N_2/(Q - L_2) \quad .$$

Therefore,

$$\tau_1 = N_1/[(N_2/\tau_2) + L_2 - L_1] \quad . \tag{A}$$

From Eq. (9),

$$\frac{1}{\tau_1} = (\Sigma p_i n_i)_1$$

and

$$\frac{1}{\tau_2} = \frac{1}{\tau_1} + (\Sigma p_i n_i)_2 \tag{B}$$

by the text definition of $(\Sigma p_i n_i)_2$ as nuclides added to the first solution to make up the second solution.

Dividing Eq. (A) by N_2:

$$\tau_1 = \frac{N_1/N_2}{\frac{1}{\tau_2} + \frac{L_2 - L_1}{N_2}}$$

and substituting from Eq. (B)

$$\tau_1 = \frac{N_1/N_2}{\frac{1}{\tau_1} + (\Sigma p_i n_i)_2 + \frac{L_2 - L_1}{N_2}} \quad , \tag{C}$$

then collecting terms:

$$\tau_1 = \frac{N_1/N_2 - 1}{(\Sigma p_i n_i)_2 + \frac{L_2 - L_1}{N_2}} \quad . \tag{10}$$