### Editorial Advisory Committee

MANSON BENEDICT DEAN BROWN JACK CHERNICK E. RICHARD COHEN E. C. CREUTZ FRANK G. DAWSON O. E. DWYER PAUL GAST D. H. GURINSKY A. F. HENRY D. G. Hurst A. A. Johnson L. W. NORDHEIM HUGH C. PAXTON FRED W. THALGOTT A. M. WEINBERG

### ANS Officers

KARL P. COHEN President Louis H. Roddis, Ir. Vice President JAMES R. LILIENTHAL Treasurer OCTAVE J. DU TEMPLE **Executive Secretary** 

## ANS Publications Staff

JOHN GRAHAM Senior Staff Editor RUTH FARMAKES Assistant Staff Editor DENNIS BRUMMELL Design and Production Editor June Johnson Art Editor DIANNE DORAN Copy Editor IEAN BARR Production Assistant

## Composition

BELJAN, ANN ARBOR, MICH.

BELJAN, ANN ARBOR, MICH.

Nuclear Science and Engineering is published monthly by the American Nuclear Society, Incorporated, with executive and business offices at 244 East Ogden Avenue, Hinsdale, Illinois 60521—telephone 312/325-1991. Subscription rate is \$25/volume: Volumes 35, 36, 37, and 38 will be published during 1969: address subscription orders to the American Nuclear Society (back issues of Volumes 1-17 are available from Academic Press, 111 Fifth Avenue, New York, N.Y.). Second-class postage is paid at Hinsdale, Illinois and at additional mailing offices. Nuclear Science and Engineering is printed in Danville, Illinois. Copyright 1969 by the American Nuclear Society, Inc. Inquiries about the distribution and delivery of NUCLEAR SCIENCE AND ENGINEERING and requests for changes of address should be directed to the publisher, the American Nuclear Society, 244 East Ogden Avenue, Hinsdale, Illinois 60521. Allow 6 weeks for a change to become effective.

# NUCLEAR SCIENCE and ENGINEERING

No. 3 JUNE, 1969 VOL. 36,

#### Contents

#### TECHNICAL PAPERS

Calculation of Temperature Distributions in Fuel Rods with Varying Conductivity and Asymmetric Flux Distribution D. G. Andrews and M. Dixmier	259
The Computation of the Equilibrium Vapor Composition Over $UO_{2+x}$	268
Elastic and Inelastic Scattering of Fast Neutrons from <sup>10</sup> B, <sup>11</sup> B, Natural Ge, and <sup>93</sup> Nb	275
The <sup>14</sup> N $(n, x\gamma)$ Reaction for $5.8 \le E_n \le 8.6$ MeV J. K. Dickens and F. G. Perey	280
Calculation of the Neutron and Proton Spectra from Thick Targets Bombarded by 450-MeV Protons and Comparison With Experiment  R. G. Alsmiller, Jr., J. W. Wachter, and H. S. Moran	291
A Numerical Treatment of the Attenuation of Neutrons by Air Ducts in Shields	295
Advantages of Using a Combination Electromagnetic and Material Shield	304
Neutron Flux and Importance Distribution by Collision Method Starting from a Generalized Source G. Bitelli and M. Salvatores	309
Discrete Energy Representation of Thermal Neutron Spectra in Uranium-Plutonium Lattices B. Fredin, T. Boševski, and M. Mataušek	315
Neutron Diffusion in Aluminum-Water Lattices:  Measurements of Anisotropy in the Continuous Eigenvalue Region	326
A Detailed Method for Calculating the Low Energy Multigroup Cross Sections and the Doppler Coefficient in a Fast Reactor C. R. Adkins, T. E. Murley, and M. W. Dyos	336
Neutron Rethermalization Near a Temperature Discontinuity Between Terphenyl and Light Water	351

## Contents

the Halden Boiling Water Reactor	361	L. L. Carter and N. J. McCormick	438
A Three-Dimensional Analysis of Xenon-Induced Oscillations in Boiling Water Cooled Reactors		Single Rod Fine Distribution of the Fast Fission Ratio V. Aiello, G. Maracci, and F. Rustichelli	441
Wataru Shinoda and Susumu Mitake  Stochastic Kinetic Theory for a Space- and En-	372	An Anomaly Arising in the Collapsed-Group Flux Synthesis Approximation C. H. Adams and W. M. Stacey, Jr.	444
ergy-Dependent Zero Power Nuclear Reactor	389	On the Milne-Problem Extrapolation Distance	111
Model	309	G. R. Bond and C. E. Siewert	447
Accuracy of the Quasistatic Treatment of Spatial Reactor Kinetics K. O. Ott and D. A. Meneley	402	Application of the $j_N$ Method to Neutron Transport in Slabs and Spheres $H$ . Kschwendt	447
Analytical and Experimental Investigations of the Kinetic Behavior of a Uranium Dioxide-Fueled Pressurized-Water Reactor	412	Equivalence of Integral Transform and Spatial Spherical Harmonics Methods J. Mika and R. Stankiewicz	4 50
TECHNICAL NOTES		Collisional Importance and Adjoint Problems in Neutron Transport Paul Nelson, Jr.	453
Pressure Pulse Propagation in an Annular Flowing Two-Phase System			
C. W. Garrard, Jr. and R. S. Wick	427	COMPUTER CODE ABSTRACT	456
A Systematic Comparison of Different Hydro- dynamics Models	429	LETTER TO THE EDITOR	
Monatomic Gas Cross Section Expansion Coefficients	433	On Rafalski's Solution to the Albedo Problem G. C. Pomraning	457
Selected Fission Cross Sections for <sup>236</sup> U	434	BOOK REVIEWS	458
Space-Angle Synthesis	435	VOLUME AUTHOR and SUBJECT INDEXES following page	462