Editorial Advisory Committee

MANSON BENEDICT DEAN BROWN **JACK CHERNICK** E. RICHARD COHEN E. C. CREUTZ O. E. DWYER PAUL GAST D. H. GURINSKY A. F. HENRY D. G. Hurst A. A. JOHNSON L. W. Nordheim RALPH T. OVERMAN RONALD S. PAUL Hugh C. Paxton FRED W. THALGOTT A. M. WEINBERG

Publications Committee

James R. Lilienthal, Chairman E. Alfred Burrill Margaret K. Butler Rorert W. Dickinson M. A. Greenfield F. E. Jamerson William R. Kanne John L. Kuranz John H. Martens Howard D. Philipp Roy G. Post

ANS Publications Staff

John Graham
Senior Staff Editor
RUTH FARMAKES
Assistant Staff Editor
RICHARD HARRIS
Design and Production Editor
MARY M. GRIFFITH
Art Editor
EDITH SMITH
Copy Editor
JEAN BARR
Production Assistant

Composition

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 27. 28, 29, and 30 will be published during 1967: 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® 1967 by the American Nuclear Society, Inc.

NUCLEAR SCIENCE and ENGINEERING®

VOL. 28, No. 1 April 1967

Contents

TECHNICAL PAPERS	
Use of Hydraulic Models in Nuclear Reactor Design	_
G. Hetsroni A Visual and Frictional Pressure-Drop Study of Natural-Circulation Single-Component Two-Phase Flow at Low	1
Pressures Min-Nan Huang and M. M. El-Wakil The Use of Spherical UO ₂ in a Cermet Fuel Plate	12
F. C. Robertshaw, R. K. Betts, and D. E. Conner Performance of Pyrolytic Carbon-Coated Uranium Oxide Particles During Irradiation at High Temperature	20
P. E. Reagan, R. L. Beatty, and E. L. Long, Jr. Irradiation Behavior of Uranium Fuel Tubes in a Pres-	34
surized Heavy-Water Reactor	42
F. J. Salzano and S. Aronson	51 55
Beta Particle Backscattering	99
239 by 2-eV to 10-keV Neutrons	62
Reactors with Linear Feedback	72
Transient Phenomena in a Fast Reactor Core	82
Solution of Group-Diffusion Equation Using Green's Function Keisuke Kobayashi and Hiroshi Nishihara	93
An Analogy Between Time-Dependent Diffusion Theory and Classical Mechanics B. E. Clancy and M. Tavel Inelastic Scattering Measurements in a Fast Reactor by	105
the Spherical Shell Method	111
Section Transport Equation Raymond L. Murray, Charles E. Siewert, and Walter J. Harrington The Effect of Anisotripic Scattering in Plane-Geometry	124
Transport Theory and Monte Carlo Calculations M. R. Mendelson	127
Total Neutron Cross Section of Protactinium-233 F. B. Simpson and J. W. Codding, Jr.	133
The Thermal-Neutron Capture Cross Section of ¹⁴⁷ Sm L. Forman and F. A. White	139
TECHNICAL NOTES	
Dose Buildup Factors of Plane Parallel Barriers For 187Cs Plane Monodirectional Source	
Kozo Tamura and Akira Tsuruo	144
Method for Calculating Average Thermal Neutron Parameters J. J. Bulmer and P. B. Daitch Comment on the Calculation of the Scattering Cross Sec-	145
tion for Multiple Resonances	149
G. C. Pomraning Asymptotic Neutron Pulse Velocity and the System Dis-	150
persion Law	152
LETTERS TO THE EDITOR Further Comment on the Optimal Shutdown Control Yoshikuni Shinohara and Jean Valat	155
Optimal Shutdown Control	156
John J. Roberts and Harold P. Smith, Jr. Comments on the Time Optimal Xenon Shutdown Problem	156
Anthony G. Dewey Remarks With Regard to an Article by Tassan	156
Rudi Stamm'ler Answer to Mr. Stamm'ler's Comments on Article on Thermal Spectrum Measurements S. Tassan	157 157
CORRIGENDA	158
Indexed in "Engineering Index" and Abstracted in "Nuclear Science Abstracts"	