their own corresponding investigation as a rather unique undertaking (and apparently decided that if a previous tabulation contained hydrogen, it should not be mentioned). Even though they also have to consider thermal flux and more details of elastic scattering, thermal designers now often use a finer group structure, with inelastic scattering, fast fission, and fission spectra treated in detail. Also, the MUFT Code was produced in order to eliminate the clumsy and questionable flux averaging procedure for group constants apologetically adopted here in Chapter VI.

This book is one more in a long line of cross section tabulations. While much data came simply from BNL-325, many involved situations were skillfully handled when results were unavailable or inconsistent. The text is extremely well written and concise, and many tables and small-sized graphs conveniently illustrate a maze of data. This study is far above average in quality and definitely worth consulting.

HARVEY AMSTER
Department of Nuclear Engineering,
University of California, Berkeley, California

[*Editor's Note: Dr. Amster received his PhD from M.I.T. in 1954 after writing a thesis on the nuclear optical model under V. F. Weisskopf. Since that time he has maintained his activity with neutron cross sections at the Bettis Atomic Power Laboratory, where he was an Advisory Scientist. He is presently Associate Professor of Nuclear Engineering at the University of California, Berkeley.*]

Nuclear Reactor Stability. By A. HITCHCOCK. Temple Press, London, 1960. 61 pp., 8 figures. Distributed in U. S. A. by Simmons-Boardman, New York. $2.75.

Nuclear Reactor Stability is a 61 page Nuclear Engineering monograph intended for university and technical college students, research assistants, and qualified technicians who require a broad understanding of those topics of nuclear engineering outside their own field of study.

The author points out the need for stability consideration for reactor systems as a result of limits set on the materials of construction through temperature or heat flux. If the power or power distribution oscillates or diverges, the steady rating must be reduced to accommodate the oscillations within the limits, and there is a loss of potential output. The consequent temperature and pressure cycling are likely to have a deleterious effect on the life of the fuel elements, and thus it is important to determine in advance whether instabilities can occur.

The monograph explains how such instabilities can arise and derives, in elementary fashion, stability criteria for several different kinds of instability. The treatment deliberately avoids the use of specialized techniques and associated terminology of control theory.

The author analyzes stability by its response after a small signal disturbance causes it to deviate from the steady state. It is stable if it returns to the steady state and unstable if it moves continuously away from the original steady state.

The diffusion equations are presented and coefficients of reactivity are derived for small variations. Conditions effecting stability and their associated time constants are discussed.

Stability analysis is carried out by setting up the linearized system equations and obtaining the roots of the characteristic equation. Stability rules are presented for the three simple cases of linear, quadratic, and cubic equations. The treatment of spatial variations is dealt with by modal analysis.

Examples of unstable systems are presented for the following: over-all positive coefficient, prompt positive with over-all negative effect, and delayed negative effect.

Temperature instability is analyzed and a numerical treatment is presented for the gas, cooled reactor of the Calder Hall type. Radial variations are analyzed by modal analysis and the form of variations in different modes is presented graphically.

Xenon instability is analyzed using linearized equations. Radial variations are considered, resolved into modes, and the characteristic equation is derived. A numerical example for the Calder Hall type reactor is presented. A treatment of axial variations is also presented.

Void instability is treated in a very elementary manner, and the direct effect of power on voids is analyzed. The author admits to this cursory treatment and recommends for an analysis with quantitative exactness that the following be taken into account: boiling boundary effect, flashing effect, and water acceleration.

The control of instability is presented. If the uncontrolled system is unstable in several modes, then there must be roughly at least as many detecting instruments and control rods as unstable modes.

In conclusion, the author has attempted to present a complex subject in a brief presentation and succeeded in pointing the way. The investigation of complete instability is not sufficient. Many systems can be determined by the author's methods to be stable, but can have unsatisfactory transient responses that are as undesirable as completely unstable systems. The author carefully avoided the use of the associated "jargon" of control theory, but in the quantitative analysis of practical systems, the use of the techniques and terminology of control theory is invaluable.

WALTER C. LIPINSKI
Argonne National Laboratory
Argonne, Illinois

[*Editor's Note: Mr. Lipinski has been engaged since August, 1950 in reactor control and instrumentation activities at Argonne National Laboratory. His personal interest in the stability of nuclear reactors began with participating in the BORAX experiments in 1953. His investigation of boiling reactor stability was continued with greater emphasis on EBWR through analysis and experimental measurements. Presently he is Head of the Reactor Control and Instrumentation Section of the Reactor Engineering Division at ANL.*]

Handbook of Thermophysical Properties of Solid Materials, Vol. I—Elements (Melting Temperature Above 1000°F). By A. GOLDSMITH, T. E. WATERMAN, AND H. J. HIRSCHHORN. Pergamon Press, New York, 1961. 758 pp., 5 vols., $90.00.

This volume is the first of five volumes composing a compilation of the thermophysical properties of solid materials prepared by the Armour Research Foundation under contract with the United States Air Force. This first volume contains values for the physical properties of elements with