

ure on the line. Chapter VII is devoted to the work of the Polish school on compact and quasi-compact measures, and Chapter VIII to conditional probabilities.

DOROTHY MAHARAM

*Stability by Liapunov's direct method with applications.* By Joseph La Salle and Solomon Lefschetz. Academic Press, New York, 1961. vii + 133 pp.

The stability criteria of Lyapunov's Second or Direct Method have been largely unknown to engineers in this country until very recently. The fact that they begin to be used now is in no small measure due to the authors' persistent efforts to acquaint engineers and mathematicians alike with this area of stability theory, which was developed almost entirely in the Soviet Union. The present monograph, the first on this subject written in English, is an outgrowth of these efforts. It is frankly aimed at the engineer with modest mathematical background. Thus, the principal results of Lyapunov's stability theory are presented with a minimum of technical detail; proofs of theorems when given are formulated in geometric rather than analytic language; examples selected with a view towards applications are completely worked out in the text. The pace is leisurely throughout, the exposition uncluttered and easily readable.

Chapter 1, entitled "Geometric concepts: Vectors and matrices," contains introductory material on vectors, matrices, quadratic forms and Euclidean geometry needed in the sequel. Chapter 2 on "Differential equations" forms the core of the book. Here the authors introduce the concepts of stability for a solution of an autonomous vector equation, define Lyapunov functions for such equations and prove the classical theorems of Lyapunov and Cetaev. The corresponding theorems for nonautonomous equations are mentioned only briefly. The construction of Lyapunov functions is illustrated in a number of examples of equations of second order and systems of first order, including the so-called critical case. A thorough discussion of the regions of stability, here called the extent of stability, follows. It includes proofs of the important generalizations of Lyapunov's theorems on asymptotic stability which do not require negative-definiteness of the time derivative. Chapter 3, entitled "Application of Liapunov's theory to controls," takes up a detailed study of linear control systems with continuous servo characteristic. Explicit stability criteria are derived from a suitable Lyapunov function whose construction is carried out in several cases. In Chapter 4, concerned with "Extensions of Liapunov's method," the authors discuss the use of differ-