

REVIEW

Differential and Integral Inequalities. By W. WALTER. Springer-Verlag, 1970. 352 pp. DM 74 or \$20.40.

This book shows how the theory of differential and integral inequalities can illuminate the theory of the corresponding equations by way of providing information relating to existence, uniqueness, continuous dependence on data, and maximum principles. There are four chapters, dealing with Volterra integral equations (with one independent variable), ordinary differential equations, Volterra integral equations in several variables and hyperbolic differential equations, and finally parabolic differential equations: the treatment is throughout based on a systematic use of comparison techniques. The last chapter deserves especial mention, since it is by far the longest in the book and contains material of great importance. In it we find the Nagumo-Westphal lemma, a thorough discussion of the maximum principle for nonlinear parabolic equations and Nirenberg's strong maximum principle for less general equations, uniqueness problems for parabolic systems, various kinds of initial-boundary value problems, and an existence theory for non-linear parabolic equations in one space variable. It also contains a section on boundary-layer theory, written in collaboration with K. Nickel and containing an account of Nickel's well-known work on the subject.

The book is basically a translation of the successful German original which first appeared in 1964: it differs from the original principally in that it contains more existence theory results and an appendix which provides a survey of the more important theorems on elliptic differential inequalities. The translation is good.

The many applications of the inequalities treated should ensure that this book will remain a useful work of reference for numerous portions of differential and integral equation theory, alongside such books as *Differential Inequalities* by J. Szarski and *Maximum Principles in Differential Equations* by M. H. Protter and H. F. Weinberger.

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