partial differential equations or systems of equations of hyperbolic type. Many examples from compressible flow and supersonic flow are given as applications of the mathematical theory. Numerical and graphical methods for obtaining solutions are discussed. These include differencing procedures and lattice constructions. The author observes that he did not find it possible to include the recent work of L. Schwartz. He does include an account of Hadamard's theory but not of the results of M. Riesz.

An introductory chapter discusses the classification of linear second-order partial differential equations, the Cauchy-Kowalewski existence theorem, simple examples of the wave equation and its properties as well as difference equations, and applications to gas dynamics and acoustics. The second chapter is devoted to the equation of the first order, which is treated fully, and concludes with the Hamilton-Jacobi equation and applications to mechanics.

The third chapter treats systems of quasilinear differential equations of the first order and the general second-order equation for the case of two independent variables. Many applications are made. The chapter concludes with Riemann's method of integration for the linear second-order equation. In the last chapter the restriction to two independent variables is removed. Most of the chapter is on the linear case. Huygens' principle and the Hadamard theory are given. A number of applications are made.

N. Levinson

Inequalities. By H. G. Hardy, J. E. Littlewood and G. Pólya. 2d ed. Cambridge University Press, 1952. 12+324 pp. $4.75.

The second edition of this book differs from the first (published in 1934) by the inclusion of three appendices amplifying a few points of the text. The first gives an elementary proof of the Hilbert-Artin theorem concerning the representation of a strictly positive homogeneous polynomial in several variables as the ratio of two sums of squares. The second gives a proof of the Riesz-Thorin theorem about the convexity of the maxima of bilinear forms. The last proves Hilbert's familiar inequality by the elementary method of maxima and minima.

Unfortunately the first edition of the book was not reviewed in this Bulletin. Clearly, there is not much point in writing a detailed review now when the book has been available to a whole generation of analysts, and a few words of comment may suffice.

In retrospect, one sees that "Hardy, Littlewood and Pólya" has been one of the most important books in Analysis during the last few decades. It had an impact on the trend of research and is still influencing it. In looking through the book now one realizes how little one would like to change the existing text, though, not unnaturally, one would like to see the book expanded by the inclusion of new material. Much of this material is already in the book in the form "Miscellaneous Theorems and Examples" at the ends of the chapters, where many results are stated without proofs, or merely with indications of proofs. Today, when the main results of the theory are comparatively familiar, due, to a great extent, to the book itself, a "promotion" of a part of the small type material to a more prominent place and an elaboration of this material would seem desirable. Also, the inclusion of results pertaining to the theory of linear operations would be useful, if only in connection with the work of M. Riesz and Thorin. We now realize their importance, and today, due to the simplifications of the proofs and the further development of the theory of linear operations, such results are much more within the reach of the beginner than they were twenty years ago.

A. ZYGMUND

Theory of elasticity and plasticity. By H. M. Westergaard. (Harvard Monographs in Applied Science, no. 3.) New York, Wiley, 1952. 14+176 pp. $5.00.

It was the intention of the author to write a textbook on elasticity and plasticity, containing, in particular, a unified account of his own researches and of the aspects of the subject to which they pertain. The introduction indicates that the present work corresponds to the first half of the project, and there are passages which probably would have been revised if even this part had not been completed under the pressure of time and illness. The author died in 1950.

The work as it stands refers almost exclusively to elasticity and may be divided roughly into three parts: scope and history, fundamental concepts, inverse and semi-inverse solutions obtained by stress functions and strain functions.

The author's historical remarks, both in his second chapter and in the numerous careful annotations throughout the rest of the work, are drawn almost entirely from his own experience in the literature. They constitute a valuable supplement to what is generally known, particularly since they refer to work whose date, or at least whose main interest, is subsequent to the definitive form of Love's treatise (1906). Many of the authors whose work is discussed are still active (Prandtl, v. Kármán. v. Mises, Mindlin, Nadai, and younger writers).