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BOOK REVIEW

Classic Papers in Shock Compression Science. Edited by J. N. JOHNSON & R. CHÉRET. Springer, 1998. ISBN 0387 98410 0. £76.00.

The title hints that this book may be rather unusual, and the suspicion is amply born out by the list of contributing authors, namely, S.-D. Poisson, G. G. Stokes, Rev. S. Earnshaw, B. Riemann, W. J. Morquorn Rankine, H. Hugoniot, Lord Rayleigh, G. I. Taylor, Hans Bethe and Herman Weyl, which therefore indicates that we are to read about work that has taken place over roughly a century and a half, beginning in the early nineteenth. The original articles were written in the authors' native languages, but the reproductions here are uniformly presented in the English language as part of the editors' intention to make the contents of these papers widely available.

Apart from a brief biography of each of the contributors, by way of an introduction to their work and times, the book consists entirely of original articles by these distinguished scientists, engineers, and mathematicians, that the editors believe have made significant contributions to the study of shock waves in continua. If one wants a concise summary of each of these contributions one can really do no better than consult §51 in the book by Courant & Friedrichs (1948); for anyone interested in shock science Courant & Friedrichs will probably be on their shelves or, at a minimum, be readily available from their library.

It should be pointed out that the present volume is one in a series entitled *High-Pressure Shock Compression of Condensed Matter*, which might be thought to be a little misleading in view of the fact that, inevitably, a great deal of the work that this volume contains is concerned with waves in gases. It is explained in the Preface that it was the way in which studies of wave propagation in solids and liquids have been evolving in recent years that encouraged the editors to search for the original work that provided the foundations on which these researches have been built. Ordinarily such foundation studies would be readily accessible in science libraries, but several of those presented here must now count as items to be found only in historical archives.

The case of the article by Bethe, which deals in a very general way with the thermodynamics of shock waves, and which is therefore of special interest to the condensed-matter fraternity, is rather different. It first appeared in 1942 as, to quote the editors, '...an obscure report for the [American] Office of Scientific Research and Development...' when Bethe was at Los Alamos working on the Manhattan Project. Its relative inaccessibility has therefore, in all probability, been due less to antiquity than to security. Indeed, Weyl's rather similar study was completed in 1944 (and published in 1949) without any knowledge of Bethe's contributions. It is not easy, even now, to locate a copy of Bethe's very significant contribution to shock science, and there is even some disagreement about where the document can be found (see below). Its presence in the current volume could, arguably, be the best reason in favour of the present publication. In passing, it is worth remarking that, although similar to Bethe's work in intent, Weyl's article deals more with the mathematics of shocks whereas Bethe's paper deals at length with physical aspects of the problem.

Of course shock science is constantly brought up to date. One thinks at once of Lighthill's masterly account of such matters, published in 1956 in the book that celeberates G. I. Taylor's seventieth birthday; of the article by W. D. Hayes on

gasdynamic discontinuities (1960); and of the more recent work by Menikoff & Plohr (1989) that discusses Riemann problems for the flow of real materials. All of these modern authors refer to work by contributors to the present volume. Lighthill refers to the papers by Hugoniot, Rankine, Rayleigh, Riemann and Taylor, although he chose to list an article by Bethe & Teller, rather than the one by Bethe alone, since the former deals directly with deviations from thermal equilibrium in shocks and is therefore more relevant to Lighthill's study. Hayes refers to Hugoniot, Bethe, Rayleigh, Rankine, Taylor and Lighthill. Menikoff & Plohr quote Bethe (but with a completely different reference to the one given in this book), Riemann, Weyl and Hayes.

Evidently it is possible to find out *who* did what, from the time of Poisson, by reading the more recent articles given in the list of References for example. If one wants to discover *how* the originators did what they did, then the present volume does perform a useful service.

REFERENCES

Courant, R. & Friedrichs, K. O. 1948 *Supersonic Flow and Shock Waves*. Interscience.

Hayes, W. D. 1960 *Gasdynamic Discontinuities*. Princeton University Press.

Lighthill, M. J. 1956 Viscosity effects in sound waves of finite amplitude. In *Surveys in Mechanics, G. I. Taylor 70th Anniversary Volume* (ed. G. K. Batchelor & R. M. Davies), pp. 250–351 Cambridge University Press.

Menikoff, R. & Plohr, B. J. 1989 The Riemann problem for fluid flow of real materials. *Rev. Mod. Phys.* **61**, 75–130.

J. F. Clarke