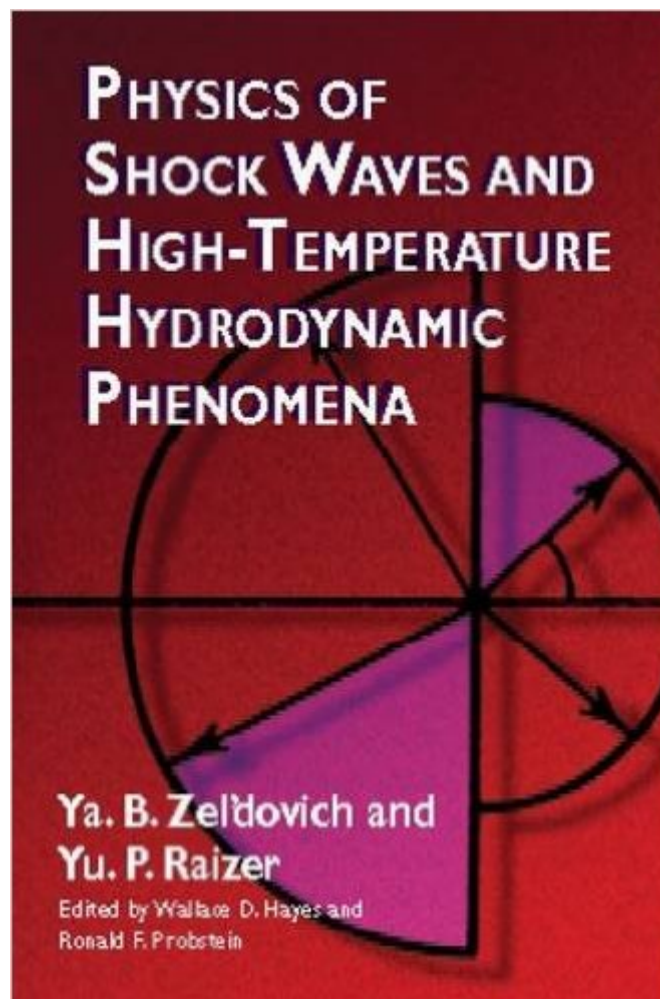


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# Physics Of Shock Waves And High-Temperature Hydrodynamic Phenomena (Dover Books On Physics)



## Synopsis

High temperatures elicit a variety of reactions in gases, including increased molecular vibrations, dissociation, chemical reactions, ionization, and radiation of light. In addition to affecting the motion of the gas, these processes can lead to changes of composition and electrical properties, as well as optical phenomena. These and other processes of extreme conditions — such as occur in explosions, in supersonic flight, in very strong electrical discharges, and in other cases — are the focus of this outstanding text by two leading physicists of the former Soviet Union. The authors deal thoroughly with all the essential physical influences on the dynamics and thermodynamics of continuous media, weaving together material from such disciplines as gas dynamics, shock-wave theory, thermodynamics and statistical physics, molecular physics, spectroscopy, radiation theory, astrophysics, solid-state physics, and other fields. This volume, uniquely comprehensive in the field of high-temperature gas physics and gas dynamics, was edited and annotated by Wallace D. Hayes and Ronald F. Probstein, leading authorities on the flow of gases at very high speeds. It is exceptionally well suited to the needs of graduate students in physics, as well as professors, engineers, and researchers.

## Book Information

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## Customer Reviews

The republication by Dover Publications of this masterwork by Ya. B. Zel'dovich and Yu. P. Raizer will be welcomed by all workers dealing with high-temperature (radiating) flows. This book is a

virtual "Bible" for studies of shocks and radiation fronts in high speed aeronautics, astronautics (re-entry), astrophysics, fireballs, shock tubes, and very intense explosions. Zel'dovich was a physicist of extraordinary breadth of interests. The style of this book is to give heuristic explanations followed by rigorous analysis. It is insightful for both beginning students and researchers in the field. This book is an **ABSOLUTE MUST** for anyone working on the subjects listed above. The Dover edition binds both original volumes as one, and is based on the very scarce second printing, in which most of the typographical errors in the first printing were corrected. All other errors noted over the years since the original edition went out of print have been collected and corrected in this version, which should be virtually error free. I **URGE** anyone working in astrophysics and high-temperature flow physics to buy, read, enjoy, and be enlightened by this masterpiece.

This majisterial work by the famous Russian physicist/astrophysicist Yakov B. Zeldovich is the first and last book to refer to when studying the hydrodynamics of compressible fluids at high temperatures. The author's primary goal is to describe (as well as possible in a roughly 1000 page text) the physics, chemistry, and radiation diagnostics (i.e. radiative transfer) of a 20 kt thermonuclear explosion in the atmosphere. This book will be of use to a wide range of physicists and astrophysicists in other areas of research as well, though. The book begins with a (brief) discussion of the basics of the physics of shocks (and the hydrodynamics/thermodynamics of supersonic flow in general). More detailed topics include a detailed discussion of the ionization of the air (i.e. a change of adiabatic index from  $7/5$  to  $5/3$ ), the broad band spectrum of the explosion, and many others. Any absolute must have for any scientist studying compressible/supersonic flows.

I've wasted many credit hours taking physics courses all the way up through grad school and never learned a damned thing! This book reignited my interest in physics. It explains how to think about the physics and what things mean as opposed to the typical nonsense of here's the equation and the solution (solution obtained by some absurd change of variable or transformation that you will never be able to guess if you lived a  $1.0E12$  years!) Gives great insight on physical modeling. This is one of few physics books I cannot live without. This is one of 3 books that allowed me to get a Ph.D! However, it is not for beginners. You must have some experience in fluid mechanics and quantum mechanics in order to appreciate the material. The book is not going to tell you how to solve problems, but focus on the meaning of results.

You only have to read a couple of chapters from this book if you are a beginner in shock wave

science to gain a basic understanding. This is an excellent book together with Courant's book *Supersonic Flow and Shock Waves (Applied Mathematical Sciences)* (v. 21)

The author is the "father" of high temperature, high pressure physics. While not discussed directly, clearly this book is a data dump of the knowledge in the USSR developed during their nuclear weapons programs..... many of the physicist that developed the Soviet nuclear capabilities were Jewish and this book should be a tribute to their contribution (in particular in light of Stalin's purge of the Jews from all high positions).

This book is a classic. I have used it for years. It originally came in two volumes. Someone borrowed my old Volume I and failed to return it. I now have both volumes in one convenient package.

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