

Hypersonic And High Temperature Gas Dynamics Second Edition Aiaa Education

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this book is the second edition of a successful self contained text for those students and readers interested in learning hypersonic flow and high temperature gas dynamics like the first edition it assumes no prior familiarity with either subject on the part of the reader if you have never studied hypersonic and or high temperature gas dynamics before and if you have never worked extensively in the area then this book is for you on the other hand if you have worked and or are working in these areas and you want a cohesive presentation of the fundamentals a development of important theory and techniques a discussion of the salient results with emphasis on the physical aspects and a presentation of modern thinking in these areas then this book is also for you in other words this book is designed for two roles 1 as an effective classroom text that can be used with ease by the instructor and understood with ease by the student and 2 as a viable professional working tool for engineers scientists and managers who have any contact in their jobs with hypersonic and or high temperature flow because of its success most of the first edition has been carried over to the second edition with the addition of much new material this second edition has updated figures and data to complement the presentation and discussion of the fundamentals new to this edition are some educational tools that the author has found successful in previous books 1 previews of each chapter written in plain language to inform the reader why it is important to read and understand the material in the chapter to highlight the important aspects and to whip up the readers interest 2 design examples scattered throughout the book to illustrate the applic

high temperature gas dynamics is a primer for scientists engineers and students who would like to have a basic understanding of the physics and the behavior of high temperature gases it is a valuable tool for astrophysicists as well the first chapters treat the basic principles of quantum and statistical mechanics and how to derive thermophysical properties from them special topics are included that are rarely found in other textbooks such as the thermophysical and transport properties of multi temperature gases and a novel method to compute radiative transfer furthermore collision processes between different particles are discussed separate chapters deal with the production of high temperature gases and with electrical emission in plasmas as well as related diagnostic techniques this new edition adds over 100 pages and includes the following updates several sections on radiative properties of high temperature gases and various radiation models a section on shocks in magneto gas dynamics a section on stability of 2d ionized gas flow and additional practical examples such as mgd generators hall and ion thrusters and faraday generators

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hypersonic and high temperature gas dynamics third edition is a successful self contained text for those interested in learning hypersonic flow and high temperature gas dynamics like previous editions it assumes no prior familiarity with either subject on the part of the reader it provides a cohesive presentation of the fundamentals a development of important theory and techniques a discussion of the salient results with emphasis on the physical aspects and a presentation of modern thinking in these areas this book is designed for two roles as an effective classroom text that can be used with ease by the instructor and understood with ease by the student as a viable professional working tool for engineers scientists and managers who have any contact in their jobs with hypersonic and or high temperature flow this third edition has been updated throughout and features new figures and examples along with a user friendly interior design

this is an introductory level textbook which explains the elements of high temperature and high speed gas dynamics written in a clear and easy to follow style the author covers all the latest developments in the field including basic thermodynamic principles compressible flow regimes and waves propagation in one volume covers theoretical modeling of high enthalpy flows with particular focus on problems in internal and external gas dynamic flows of interest in the fields of rockets propulsion and hypersonic aerodynamics high enthalpy gas dynamics is a compulsory course for aerospace engineering students and this book is a result of over 25 years teaching by the author accompanying website includes a solutions manual for exercises listed at the end of each chapter plus lecture slides

physical chemical processes in gases at high temperatures are focus of outstanding text by two distinguished physicists combines material from gas dynamics shock wave theory thermodynamics and statistical physics molecular physics spectroscopy radiation theory other fields for comprehensive treatment 284 black and white illustrations 1966 1967 edition originally published in two volumes

when the temperature of a gas is not too high and the density of a gas is not too low the transfer of heat by radiation is usually negligibly small in comparison with that by conduction and convection however in the hypersonic flow of space flight particularly in the re entry of a space vehicle and in the flow problem involving nuclear reaction such as in the blast wave of nuclear bomb or in the peaceful use of the controlled fusion reaction the temperature of the gas may be very high and the density of the gas may be very low as a result thermal radiation becomes a very important mode of heat transfer a complete analysis of such high temperature flow fields should be based upon a study of the gasdynamic field and the radiation field simultaneously hence during the last few years considerable efforts have been made to study such interaction problems between gasdynamic field and radiation field and a new title radiation gasdynamics has been suggested for this subject even though radiative transfer has been studied for a long time by astro physicists the interaction between the radiation field and the gasdynamic field has been only extensively studied recently

the hypersonic flow over a flat plate with sharp leading edge has been studied extensively during the past ten years particularly since a proper description of the kinetic transitional and possibly the early stages of the merged layer regimes cannot be provided by the navier stokes equations of continuum gas dynamics experimental evidence and the results of certain approximate theoretical treatments have therefore been employed to construct a variety of flow models for these non continuum regimes

a comprehensive examination of the fundamentals of compressible flow and gas dynamics

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