

# 燃烧学教材\*

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\* 2020 年度北京大学本科教学改革项目。本文件列出了部分燃烧学教材的内容。主要调查了英文教材，对中文教材只是调查了非常少的一部分。受限于调查编写人员的知识范围和调研时间，难免遗漏很多相关教材。目录中，英文教材按照标题字母排序，中文教材按照标题拼音排序。北京大学黄成扬博士输入了绝大部分英文教材包含的内容。

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## **Aerothermochemistry, Gregorio Millan Barbany**

出版信息: Escuela Tecnica Superior de Ingenieros Aeronáuticos, Madrid, España, 1958 年  
原版 50 周年纪念版, 2009 年

说明: 部分章节是基于冯卡门 1951-1952 年在法国巴黎的燃烧空气动力学课程。冯卡门在该书前言提到: “I have great pleasure in introducing the report of Prof. Gregorio Millan on Aerothermochemistry. This word refers to problems whose solution necessitates the application of fundamental principles of Thermodynamics and Chemistry especially chemical kinetics. In other words they are flow problems with exchange of heat and production of heat by means of chemical reaction”。

目录:

- 1 Thermochemistry
- 2 Transport phenomena in gas mixtures
- 3 General equations
- 4 Combustion waves
- 5 Structure of the combustion waves
- 6 Laminar flames
- 7 Turbulent flames
- 8 Ignition, flammability and quenching
- 9 Flows with combustion waves
- 10 Aerothermodynamic field of a stabilized flame
- 11 Similarity in combustion applications
- 12 Diffusion flame
- 13 Combustion of liquid fuels

## **An Introduction to Combustion: Concepts and Applications, Stephen R. Turns**

出版信息: McGraw-Hill, 3<sup>rd</sup> Edition, 2012 年

说明: 本科生燃烧课经典教材。有中文翻译版(姚强、李水清及王宇翻译, 清华大学出版社出版)。该书前言提到: “The third edition retains the same primary objectives as previous editions: first, to present basic combustion concepts using relatively simple and easy-to-understand analyses; and second, to introduce a wide variety of practical applications that motivator relate to the various theoretical concepts. The overarching goal is to provide a textbook that is useful for both formal undergraduate and introductory graduate study in mechanical engineering and related fields, and informal study by practicing engineers”。

目录:

- 1 Introduction
- 2 Combustion and Thermochemistry
- 3 Introduction to Mass Transfer
- 4 Chemical Kinetics
- 5 Some Important Chemical Mechanisms
- 6 Coupling Chemical and Thermal Analyses of Reacting Systems
- 7 Simplified Conservation Equations for Reacting Flows
- 8 Laminar Premixed Flames
- 9 Laminar Diffusion Flames
- 10 Droplet Evaporation and Burning
- 11 Introduction to Turbulent Flows
- 12 Turbulent Premixed Flames
- 13 Turbulent Nonpremixed Flames
- 14 Burning of Solids
- 15 Emissions
- 16 Detonations
- 17 Fuels

## **An Introduction to Fire Dynamics, Dougal Drysdale**

出版信息: John Wiley & Sons, Ltd, 2<sup>nd</sup> Edition, 1999 年

说明:

目录:

- 1 Fire science and combustion
- 2 Heat transfer
- 3 Limits of flammability and premixed flames
- 4 Diffusion flames and fire plumes
- 5 Steady burning of liquids and solids
- 6 Ignition: The initiation of flaming combustion
- 7 Spread of flame
- 8 Spontaneous ignition with solids and smouldering combustion
- 9 The pre-flashover compartment fire
- 10 The post-flashover compartment fire
- 11 The production and movement smoke

## **An Introduction to Turbulent Reacting Flows, R.S. Cant, E. Mastorakos**

出版信息: Cambridge University Press, 1<sup>st</sup> Edition, 2008 年

说明: 作者根据其在剑桥大学工程系的湍流燃烧课程讲义编写而成。

目录:

1 Introduction

2 Some Comments on Turbulence

3 Mixing

4 Flows with Non-premixed Reactants

5 Flows with Premixed Reactants

6 Numerical Methods for Reacting Flows

7 Experimental Methods for Reacting Flows

8 Epilogue

## **Analysis of Kinetic Reaction Mechanisms, Tamas Turanyi, Alison S.**

**Tomlin**

出版信息: Springer, 1<sup>st</sup> Edition, 2014 年

来自该书的介绍: “This book is a monograph for researchers and engineers dealing with detailed kinetic reaction mechanisms and also a textbook for graduate students of related courses in chemistry, mechanical engineering, environmental science and biology”。

目录:

- 1 Introduction
- 2 Reaction Kinetics Basics
- 3 Mechanism Construction and the Sources of Data
- 4 Reaction Pathway Analysis
- 5 Sensitivity and Uncertainty Analyses
- 6 Timescale Analysis
- 7 Reduction of Reaction Mechanisms
- 8 Similarity of Sensitivity Functions
- 9 Computer Codes for the Study of Complex Reaction Systems
- 10 Summary and Concluding Remarks



## **Applications of Turbulent and Multiphase Combustion, Kenneth Kuo-yun Kuo, Ragini Acharya**

出版信息: John Wiley & Sons, Inc., 1<sup>st</sup> Edition, 2012 年

来自该书前言: “Due to these ongoing developments and advancements, theoretical modeling and numerical simulation hold great potential for future solutions of problems. In these two new books, we have attempted to integrate the fundamental theories of turbulence, combustion, and multiphase phenomena as well as experimental techniques, so that readers can acquire a firm background in both contemporary and classical approaches. The first book volume is called *Fundamentals of Turbulent and Multiphase Combustion*; the second is called *Applications of Turbulent and Multiphase Combustion*. The first volume can serve as a graduate-level textbook that covers the area of turbulent combustion and multiphase reacting flows as well as material that builds on these fundamentals. This volume also can be useful for research purpose. It is oriented toward the theories of combustion, turbulence, multiphase flows, and turbulent jets. Whenever appropriate, experimental setups and results are provided. ...Volume 2 focus on the application aspect of fundamental concepts and can form the framework for an advanced graduate-level course in combustion of condensed-phase materials. ...Although several chapters address solid propellant combustion, this volume is not a textbook for solid propellant combustion; many topics in this area are not included due to space limitations”。

目录:

- 1 Applications of Turbulent and Multiphase Combustion
- 2 Thermal Decomposition and Combustion of Nitramines
- 3 Burning Behavior of Homogeneous Solid Propellants
- 4 Chemically Reacting Boundary-Layer Flows
- 5 Ignition and Combustion of Single Energetic Solid Particles
- 6 Combustion of Solid Particles in Multiphase Flows
- Appendix A: Useful Vector and Tensor Operations
- Appendix B: Constants and Conversion Factors Often Used in Combustion
- Appendix C: Naming of Hydrocarbons
- Appendix D: Particle Size–U.S. Sieve Size and Tyler Screen Mesh Equivalents

## **Chemical Kinetics, Keith J. Laidler**

出版信息: Pearson Education Inc., 3<sup>rd</sup> Edition, 1987 年

说明:

目录:

- 1 Basic Kinetic Concepts
- 2 Analysis of Kinetic Results
- 3 Energy of Activation
- 4 Theories of Reaction Rates
- 5 Elementary Gas-Phase Reactions
- 6 Elementary Reactions in Solution
- 7 Reactions on Surfaces
- 8 Composite Reactions
- 9 Photochemical and Radiation-Chemical Reactions
- 10 Isotope Effects
- 11 Reaction Dynamics

## **Chemical Kinetics and Reaction Dynamics, Paul L. Houston**

出版信息: Dover Publications, Inc., 1<sup>st</sup> Edition, 2001 年

说明:

目录:

- 1 Kinetic Theory of Gases
- 2 The Rates of Chemical Reactions
- 3 Theories of Chemical Reactions
- 4 Transport Properties
- 5 Reactions in Liquid Solutions
- 6 Reactions at Solid Surfaces
- 7 Photochemistry
- 8 Molecular Reaction Dynamics

## **Chemically Reacting Flow: Theory, Modeling, and Simulation, Robert J.**

**Kee, Michael E. Coltrin, Peter Glarborg, and Huayang Zhu**

出版信息: John Wiley & Sons, Inc., 2<sup>nd</sup> Edition, 2018 年

说明: 有基于该书第一版的中文翻译版(由史翊翔、蔡宁生及王雨晴翻译, 清华大学出版社出版), 该书前言提到: “This book is written to assist engineers and scientists who are working to design, improve, or optimize chemically reacting flow processes. Although the general subject of chemically reacting flow is quite broad, the intent here is rather more narrowly focused. The content is particularly concerned with laminar, internal flows, often with heterogeneous chemistry at the reactor surfaces. The emphasis is motivated by applications such as thin-film processing and combustion. Nevertheless, since the theoretical and computational development in the book is grounded in fundamental principles, the reader should be well prepared to extend the concepts into new applications. The writing is intended to be in a form that can be used either as reference material or in an educational setting”。

目录:

- 1 Introduction
- 2 Fluid Properties
- 3 Fluid Kinematics
- 4 Conservation Equations
- 5 Parallel Flows
- 6 Similarity and Local Similarity
- 7 Stagnation Flows
- 8 Boundary-Layer Channel Flow
- 9 Low-Dimensional Reactors
- 10 Thermochemical Properties
- 11 Molecular Transport
- 12 Mass-Action Kinetics
- 13 Reaction Rate Theories
- 14 Reaction Mechanisms
- 15 Laminar Flames
- 16 Heterogeneous Chemistry
- 17 Reactive Porous Media
- 18 Electrochemistry

## **Cleaner Combustion: Developing Detailed Chemical Kinetic Models,**

**Frédérique Battin-Leclerc, John M. Simmie, and Edward Blurock**

出版信息: Springer-Verlag, 1<sup>st</sup> Edition, 2013 年

说明:

目录:

- 1 Introduction
- 2 Modeling Combustion with Detailed Kinetic Mechanisms
- 3 Automatic Generation of Detailed Mechanisms
- 4 Specificities Related to Detailed Kinetic Models for the Combustion of Oxygenated Fuels Components
- 5 Multistep Kinetic Model of Biomass Pyrolysis
- 6 Speciation in Shock Tubes
- 7 Rapid Compression Machines
- 8 Jet-Stirred Reactors
- 9 Tubular Flow Reactors
- 10 Flame Studies of Oxygenates
- 11 Formation and Characterization of Polyaromatic Hydrocarbons
- 12 Laser Diagnostics for Selective and Quantitative Measurement of PAHs and Soot
- 13 Characterization of Soot
- 14 An Advanced Multi-Sectional Method for Particulate Matter Modeling in Flames.
- 15 Modelling Soot Formation: Model of Particle Formation
- 16 Investigation and Improvement of Reaction Mechanisms Using Sensitivity Analysis and Optimization
- 17 Mechanism Reduction to Skeletal Form and Species Lumping
- 18 Time-Scale Splitting-Based Mechanism Reduction
- 19 Storage of Chemical Kinetic Information
- 20 Calculation of Molecular Thermochemical Data and Their Availability in Databases
- 21 Statistical Rate Theory in Combustion: An Operational Approach
- 22 Primary Products and Branching Ratios for Combustion Multi-Channel Bimolecular Reactions from Crossed Molecular Beam Studies
- 23 Kinetic Studies of Elementary Chemical Steps with Relevance in Combustion and Environmental Chemistry
- 24 Shock Tube Studies of Combustion Relevant Elementary Chemical Reactions and Submechanisms

## **Coal Combustion and Gasification, L. Douglas Smoot, Philip J. Smith**

出版信息: Springer, 1<sup>st</sup> Edition, 1985 年

说明:

目录:

- 1 Introduction
- 2 Solid Fossil Fuels (Mostly Coal): Processes and Properties
- 3 Coal Particle Ignition and Devolatilization
- 4 Heterogeneous Char Reaction Processes
- 5 Combustion of Coal in Practical Flames
- 6 Gasification of Coal in Practical Flames
- 7 Modelling of Coal Processes
- 8 Evaluation of Comprehensive Models
- 9 Basic Modeling Equations
- 10 Turbulence
- 11 Chemistry and Turbulence of Gaseous Fuels
- 12 Particulate and Droplet Reactions in Turbulent Flows
- 13 Chemistry and Turbulence of Coal Reaction Products
- 14 Radiative Heat Transfer
- 15 No<sub>x</sub> Pollutant Formation in Turbulent Coal Systems

## **Combustion, Irvin Glassman, Richard A. Yetter, and Nick G. Glumac**

出版信息: Elsevier, 5<sup>th</sup> Edition, 2015 年

说明: 燃烧经典教科书。该书前言提及: “For the fifth edition of Combustion, the approach taken of providing students and practicing professionals with the fundamental physical and chemical principles of combustion has not changed from the previous editions of the book. The emphasis remains on clarity of concepts and on elaborating upon the physical insights essential to understanding”。

目录:

- 1 Chemical thermodynamics and flame temperatures
- 2 Chemical kinetics
- 3 Explosive and general oxidative characteristics of fuels
- 4 Flame phenomena in premixed combustible gases
- 5 Detonation
- 6 Diffusion flames
- 7 Ignition
- 8 Environmental combustion considerations
- 9 Combustion of nonvolatile fuels
- Appendix A: Thermochemical data and conversion factors
- Appendix B: Adiabatic flame temperatures of hydrocarbons
- Appendix C: Specific reaction rate constants
- Appendix D: Bond dissociation energies of hydrocarbons
- Appendix E: Flammability limits in air
- Appendix F: Laminar flame speeds
- Appendix G: Spontaneous ignition temperature data
- Appendix H: Minimum spark ignition energies and quenching distances
- Appendix I: Programs for combustion kinetics

## **Combustion and Mass Transfer, D Brian Spalding**

出版信息: Pergamon Press, 1<sup>st</sup> Edition, 1979 年

说明:

目录:

- 1 Introduction to Combustion
- 2 Mass Transfer I
- 3 Droplet Vaporisation I
- 4 Mass Transfer II
- 5 Droplet Vaporisation II
- 6 Mass Transfer III
- 7 Droplet Combustion
- 8 Liquid-Propellant Rocket
- 9 The Laminar Jet
- 10 The Laminar Diffusion Flame
- 11 The Turbulent Jet
- 12 The Turbulent Diffusion Flame
- 13 Survey of Kinetically-Influenced Phenomena
- 14 Introduction to Chemical Kinetics
- 15 Spontaneous Ignition
- 16 The Stirred Reactor
- 17 Flame Stabilisation by Bluff Bodies
- 18 Propagation of a Laminar Flame Through a Pre-mixed Combustible Gas
- 19 Ignition by Pilot Flames and Sparks
- 20 Coal-Particle Combustion



## **Combustion Chemistry, W. C. Gardiner, Jr.**

出版信息: Springer-Verlag, 1<sup>st</sup> Edition, 1984 年

说明:

目录:

1 Introduction to Combustion Modeling

2 Computer Modeling of Combustion Reactions in Flowing Systems with Transport

3 Bimolecular Reaction Rate Coefficients

4 Rate Coefficients of Thermal Dissociation, Isomerization, and Recombination Reactions

5 Rate Coefficients in the C/H/O/System

6 Survey of Rate Constants in the N/H/O System

7 Modeling

8 Thermochemical Data for Combustion Calculations

Appendix A: Program for finding coefficients of NASA Polynomials

Appendix B: Program Written by A. Lifshitz and A. Burcat for Evaluating the Coefficients of the Wilhoit Polynomials

Appendix C: Table of Coefficient Sets for NASA Polynomials

## **Combustion, Flames and Explosions of Gases, Bernard Lewis, Guenther von Elbe**

出版信息: Harcourt Brace Jovanovich, Academic Press, 3<sup>rd</sup> Edition, 1987 年

说明: 燃烧经典著作。有中文翻译版(由王方翻译, 中国建筑工业出版社出版)。该书前言提到: "...the basic purpose... (is) to provide the chemist, physicist, and engineer with the scientific basis for understanding combustion phenomena."。

目录:

- 1 Theoretical Foundations
- 2 The Reaction between Hydrogen and Oxygen
- 3 The Reaction between Carbon Monoxide and Oxygen
- 4 The Reaction between Hydrocarbons and Oxygen
- 5 Combustion Waves in Laminar Flow
- 6 Combustion Waves in Turbulent Flow
- 7 Air Entrainment and Burning of Jets of Fuel Gases
- 8 Detonation Waves in Gases
- 9 Emission Spectra, Ionization, and Electric-Field Effects in Flames
- 10 Methods of Flame Photography and Pressure Recording
- 11 Temperature, Pressure, and Volume of the Burned Gas
- 12 Temperature and Radiation of the Burned Gas
- 13 Industrial Heating
- 14 Internal Combustion Engines
- Appendix A: Data for Thermochemical Calculations
- Appendix B: Reaction Rate Coefficients
- Appendix C: Limits of Flammability
- Appendix D: Flame Temperatures

**Combustion: From Basics to Applications, Maximilian Lackner, Árpád B. Palotás, and Franz Winter**

出版信息: Wiley-VCH, 1<sup>st</sup> Edition, 2013 年

说明:

目录:

1 History of Combustion

2 Fuels

3 Combustion Principles

4 Environmental Impacts

5 Measurement Methods

6 Applications

7 Safety Issues

## **Combustion Instability, M. S. Natanzon, F. E. C. Culick**

出版信息: American Institute of Aeronautics and Astronautics, Inc., 1<sup>st</sup> Edition, 1986 年

说明:

目录:

- 1 Low Frequency Oscillations in Liquid Rocket Combustion Chambers .
- 2 Phenomenological Models of the Combustion Process
- 3 The Acoustic Response of the Combustion Chamber
- 4 High-Frequency (Acoustic) Oscillations in a Combustion Chamber
- 5 Nonlinear Effects
- 6 Application of the Frequency-Response Method for Studying the Dynamical Properties of the Combustion Zone
- 7 Stability of Combustion of Fuel Drops in a Flow of Gaseous Oxidizer
- 8 Bifurcations of Steady Combustion Regimes and Their Effect on the Onset of High-Frequency Oscillations

**Combustion Phenomena: Selected Mechanisms of Flame Formation,  
Propagation, and Extinction, Jozef Jarosinski, Bernard Veyssiere**

出版信息: Taylor & Francis Group, LLC., 1<sup>st</sup> Edition, 2009 年

该书前言提及: “This book is a supplementary source of knowledge on combustion, to facilitate the understanding of fundamental processes occurring in flames during their formation, propagation, and extinction. The characteristic feature of the book lies in the presentation of selected types of flame behavior under different initial and boundary conditions”。

目录:

- 1 Introduction: Challenges in Combustion
- 2 Diagnostics in Combustion: Measurements to Unravel Combustion Chemistry
- 3 Flammability Limits: Ignition of a Flammable Mixture and Limit Flame Extinction
- 4 Influence of Boundary Conditions on Flame Propagation
- 5 Instability Phenomena during Flame Propagation
- 6 Different Methods of Flame Quenching
- 7 Turbulent Flames
- 8 Other Interesting Examples of Combustion and Flame Formation

**Combustion: Physical and Chemical Fundamentals, Modeling and Simulation, Experiments, Pollutant Formation, J. Warnatz, U. Maas, and R.W. Dibble**

出版信息: Springer, 3<sup>rd</sup> Edition, 2006 年

该书前言提及: “The book has evolved from a lecture series (of J. Warnatz) on combustion at Stuttgart University. The lectures were intended to provide first-year graduate students (and advanced undergraduates) with a basic background in combustion. Such a course was needed since students of combustion arrive with a wide variety of backgrounds, including physics, aerodynamics, and atmospheric science”。

目录:

- 1 Introduction, Fundamental Definitions and Phenomena
- 2 Experimental Investigation of Flames
- 3 Mathematical Description of Premixed Laminar Flat Flames
- 4 Thermodynamics of Combustion Processes
- 5 Transport Phenomena
- 6 Chemical Kinetics
- 7 Reaction Mechanisms
- 8 Laminar Premixed Flames
- 9 Laminar Nonpremixed Flames
- 10 Ignition processes
- 11 Low-Temperature Oxidation, Engine Knock
- 12 The Navier-Stokes-Equations for Three-Dimensional Reacting Flows
- 13 Turbulent Reacting Flows
- 14 Turbulent Nonpremixed Flames
- 15 Turbulent Premixed Flames
- 16 Combustion of Liquid and Solid Fuels
- 17 Formation of Nitric Oxides
- 18 Formation of Hydrocarbons and Soot
- 19 Effects of Combustion Processes on the Atmosphere
- 20 Appendix 1: Mathematics
- 21 Appendix 2: Reaction Mechanisms

## **Combustion Physics, Chung K. Law**

出版信息: Cambridge University Press, 1<sup>st</sup> Edition, 2006 年

说明: 包含普林斯顿大学研究生燃烧课两学期课程内容。前八章部分内容可用于本科生课程。

目录:

0 Introduction

1 Chemical Thermodynamics

2 Chemical Kinetics

3 Oxidation Mechanisms of Fuels

4 Transport Phenomena

5 Conservation Equations

6 Laminar Nonpremixed Flames

7 Laminar Premixed Flames

8 Limit Phenomena

9 Asymptotic Structure of Flames

10 Aerodynamics of Laminar Flames

11 Combustion in Turbulent Flows

12 Combustion in Boundary-Layer Flows

13 Combustion in Two-Phase Flows

14 Combustion in Supersonic Flows

## **Combustion Theory: The Fundamental Theory of Chemically Reacting Flow Systems, Forman A Williams**

出版信息: The Benjamin/Cummings Publishing Company, Inc., 2<sup>nd</sup> Edition, 1985 年

说明: 燃烧经典著作。有中文翻译版(其中之一由庄逢辰和杨本濂翻译, 科学出版社出版)。

目录:

- 1 Summary of Relevant Aspects of Fluid Dynamics and Chemical Kinetics
- 2 Rankine-Hugoniot Relations
- 3 Diffusion Flames and Droplet Burning
- 4 Reactions in Flows with Negligible Molecular Transport
- 5 Theory of Laminar Flames
- 6 Detonation Phenomena
- 7 Combustion of Solid Propellants
- 8 Ignition, Extinction, and Flammability Limits
- 9 Combustion Instabilities
- 10 Theory of Turbulent Flames
- 11 Spray Combustion
- 12 Flame Attachment and Flame Spread Combustion
- Appendix A: Summary of Applicable Results of Thermodynamics and Statistical Mechanics
- Appendix B: Review of Chemical Kinetics
- Appendix C: Continuum Derivation of the Conservation Equations
- Appendix D: Molecular Derivation of the Conservation Equations
- Appendix E: Transport Properties



## **Combustion Waves and Fronts in Flows, Paul Clavin**

出版信息: Cambridge University Press, 1<sup>st</sup> Edition, 2016 年

说明: 由应用数学家写的燃烧理论专著。该书前言提及: “Combustion is a fascinating phenomenon coupling complex chemistry to transport mechanisms and nonlinear fluid dynamics. This book provides an up-to-date and comprehensive presentation of the nonlinear dynamics of combustion waves and other non-equilibrium energetic systems. The major advances in this field have resulted from analytical studies of simplified models performed in close relation with carefully controlled laboratory experiments. The key to understanding the complex phenomena is a systematic reduction of the complexity of the basic equations”。

目录:

- 0 Introduction
- 1 General Considerations
- 2 Laminar Premixed Flames
- 3 Turbulent Premixed Flames
- 4 Gaseous Shocks and Detonations
- 5 Conservation Equations
- 6 Chemical Kinetics of Combustion
- 7 Laser-Driven Ablation Front in ICF
- 8 Planar Flames
- 9 Flame Kernels and Flame Balls
- 10 Wrinkled Flames
- 11 Ablative Rayleigh–Taylor Instability
- 12 Shock Waves and Detonations
- 13 Statistical Physics
- 14 Chemistry
- 15 Flows

## **Computational Models for Turbulent Reacting Flows, Rodney O. Fox**

出版信息: Cambridge University Press, 1<sup>st</sup> Edition, 2003 年

该书前言提到: “In setting out to write this book, my main objective was to provide a reasonably complete introduction to computational models for turbulent reacting flows for students, researchers, and industrial end-users new to the field. The focus of the book is thus on the formulation of models as opposed to the numerical issues arising from their solution”。

目录:

- 1 Turbulent reacting flows
- 2 Statistical description of turbulent flow
- 3 Statistical description of turbulent mixing
- 4 Models for turbulent transport
- 5 Closures for the chemical source term
- 6 PDF methods for turbulent reacting flows
- 7 Transported PDF simulations
- Appendix A: Derivation of the SR model
- Appendix B: Direct quadrature method of moments

## **Detonation: Theory and Experiment, Wildon Fickett, William C. Davis**

出版信息：Dover Publications, Inc., 1<sup>st</sup> Edition, 1979 年

说明：爆轰经典专著，有中文翻译版（由薛鸿陆等译，原子能出版社出版）。

目录：

1 Introduction

2 The Simple Theory

3 Experimental Tests of The Simple Theory

4 Flow in A Reactive Medium

5 Steady Detonation

6 The Non-steady solution

7 Structure of The Front

## **Dust Explosion Dynamics, Russell A. Ogle**

出版信息: Butterworth-Heinemann of Elsevier, 1<sup>st</sup> Edition, 2016 年

说明:

目录:

- 1 Introduction to combustible dust hazards
- 2 The key physical properties of combustible dust
- 3 Thermodynamics of dust combustion
- 4 Transport phenomena for dust combustion
- 5 Smoldering phenomena
- 6 Dust particle combustion models
- 7 Unconfined dust flame propagation
- 8 Confined unsteady dust flame propagation
- 9 Dust flame acceleration effects
- 10 Comprehensive dust explosion modeling

## **Dust Explosions in the Process Industries, Rolf K. Eckhoff**

出版信息: Gulf Professional Publishing of Elsevier, 3<sup>rd</sup> Edition, 2003 年

说明:

目录:

- 1 Dust Explosions-Origin, Propagation, Prevention, and Mitigation: An Overview
- 2 Case Histories
- 3 Generation of Explosible Dust Clouds by Reentrainment and Redispersal of Deposited Dust in Air
- 4 Propagation of Flames in Dust Clouds
- 5 Ignition of Dust Clouds and Dust Deposits: Further Consideration of Some Selected Aspects
- 6 Sizing of Dust Explosion Vents in the Process Industries: Further Consideration of Some Important Aspects
- 7 Assessment of Ignitability, Explosibility, and Related Properties of Dusts by Laboratory-Scale Tests
- 8 Electrical Apparatuses for Areas Containing Combustible Dusts
- 9 Research and Development, 1990-2002
- Appendix: Ignitability and Explosibility Data for Dusts from Laboratory Tests

## **Dynamics of Combustion Systems, A. K. Oppenheim**

出版信息: Springer, 2<sup>nd</sup> Edition, 2008 年

说明:

目录:

- 1 Thermodynamic Aspects
- 2 Evolutionary Aspects
- 3 Heat Transfer Aspects
- 4 Chemical Kinetic Aspects
- 5 Aerodynamic Aspects
- 6 Random Vortex Method
- 7 Gasdynamic Aspects
- 8 Fronts and Interfaces
- 9 Blast Waves
- 10 Self-Similar Blast Wave
- 11 Phase Space Method
- 12 Detonations

## **Fifteen Lectures on Laminar and Turbulent Combustion, N. Peters**

出版信息: ERCOFTAC Summer School, Aachen, Germany, Draft version, 1992 年

该书前言提及: “This text is a revised version of the material prepared for a lecture series at the ERCOFTAC-summer school at Aachen 1992. It was intended as an introduction to the fundamentals of combustion science with the aim to supply the basic notions and equations for more detailed numerical exercises in calculating combustion phenomena.”。

目录:

0 Introduction

1 Mass and Energy Balance in Combustion Systems

2 Calculation of Adiabatic Flame Temperatures and Chemical Equilibria

3 Systematic Reduction of Reaction Kinetics for Hydrogen and Methane Flames

4 Ignition in Homogeneous Systems

5 Fluid Dynamics and Basic Equations for Flames

6 Laminar Premixed Flames: Burning Velocities and One-step Asymptotics

7 Asymptotic Structure for 4-Step Premixed Methane Flames, Lean Flammability Limits

8 Laminar Premixed Flames: Flames Shapes and Instabilities

9 Laminar Diffusion Flames: Flame Structure

10 Laminar Diffusion Flames: Different Flow Geometries

11 Turbulent Combustion: Introduction and Overview

12 Laminar Flamelet Models for Non-Premixed Turbulent Combustion

13 Turbulent Diffusion Flames: Experiments and Modeling Aspects

14 Laminar Flamelet Models for Premixed Turbulent Combustion

15 Turbulent Burning Velocities: Experiments and Correlation of Data

## **Flame and Combustion, J. F. Griffiths, J. A. Barnard**

出版信息: Springer, 3<sup>rd</sup> Edition, 1995 年

该书前言提及: "...the book should be suitable for final year undergraduates and as an introductory book about combustion phenomena for those involved in research and development in a wide range of disciplines".

目录:

- 1 Introduction
- 2 Physicochemical principles
- 3 Flames
- 4 Flame theory and turbulent combustion
- 5 Detonations
- 6 High temperature and flame chemistry ( $T > 1000\text{ K}$ )
- 7 Low temperature chemistry ( $T < 1000\text{ K}$ )
- 8 Thermal ignition
- 9 Isothermal chain branching and chain-thermal interactions
- 10 Ignition, extinction and oscillatory phenomena
- 11 Aspects of mixed and condensed phase combustion
- 12 Combustion hazards
- 13 Internal combustion engines and fuels
- 14 Combustion and the environment



## **Fluid Dynamics and Transport of Droplets and Sprays, William A.**

**Sirignano**

出版信息: Cambridge University Press, 2<sup>nd</sup> Edition, 2010 年

说明:

目录:

1 Introduction

2 Isolated Spherically Symmetric Droplet Vaporization and Heating

3 Convective Droplet Vaporization, Heating, and Acceleration

4 Multicomponent-Liquid Droplets

5 Droplet Behavior under Near-Critical, Transcritical, and Supercritical Conditions

6 Droplet Arrays and Groups

7 Spray Equations

8 Computational Issues

9 Spray Applications

10 Spray Interactions with Turbulence and Vortical Structures

11 Film Vaporization

12 Stability of Liquid Streams

Appendix A: The Field Equations

Appendix B: Conserved Scalars

Appendix C: Droplet-Model Summary

## **Fundamental Aspects of Combustion, Amable Liñán, Forman A. Williams**

出版信息: Oxford University Press, 1<sup>st</sup> Edition, 1993 年

说明:

目录:

1 Background and Formulation of Combustion

2 Premixed Flames

3 Diffusion Flames

4 Flammability, Explosions, and Detonations

5 Turbulent Combustion

6 The Future

## **Fundamentals of Combustion, Roger A. Strehlow**

出版信息: International text book company, 1<sup>st</sup> Edition, 1968 年

说明: 该书前三章不同于其它教材。

目录:

- 1 Atomic and Molecular Structure
- 2 Kinetic Theory and Statistical Thermodynamics of a Dilute Gas
- 3 The Physical Properties of Real Gases
- 4 Chemical Reactions in Gases
- 5 One-Dimensional Reactive-Gas Dynamics
- 6 General Combustion Phenomena
- 7 Premixed Gas Flames
- 8 Aerodynamics of Flames
- 9 Detonation
- 10 Solid- and Liquid-Propellant Combustion in Rockets
- Appendix A Bridgman's Table of Thermodynamic Relationships
- Appendix B Conservation of Energy Units
- Appendix C-1 Molecular Parameters for Diatomic Molecules
- Appendix C-2 Structure of Triatomic Molecules
- Appendix C-3 Characteristic Wave Numbers of Chemical Bonds
- Appendix D van Der Waals and Critical Constants of Gases
- Appendix E-1 Functions for Prediction of Transport Properties of Gases at Low Densities
- Appendix E-2 Lennard-Jones Parameters
- Appendix F Thermodynamic Properties of Selected Compounds

**Fundamentals of Combustion Processes, Sara McAllister, Jyh-Yuan Chen,  
and A. Carlos Fernandez-Pello**

出版信息: Springer, 1<sup>st</sup> Edition, 2011 年

该书前言提及: “The book is based on lectures given by the authors through the years in a senior elective undergraduate combustion class in the Department of Mechanical Engineering at the University of California, Berkeley”。

目录:

- 1 Fuels
- 2 Thermodynamics of Combustion
- 3 Chemical Kinetics
- 4 Review of Transport Equations and Properties
- 5 Ignition Phenomena
- 6 Premixed Flames
- 7 Non-premixed Flames (Diffusion Flames) .
- 8 Droplet Evaporation and Combustion
- 9 Emissions
- 10 Premixed Piston IC Engines
- 11 Diesel Engines

## **Fundamentals of Fire Phenomena, James G. Quintiere**

出版信息：John Wiley & Sons, LTD, 1<sup>st</sup> Edition, 2006 年

说明：有中文翻译版（由杜建科、王平及高亚萍翻译，化学工业出版社出版）

目录：

- 1 Introduction to Fire
- 2 Thermochemistry
- 3 Conservation Laws for Control Volumes
- 4 Premixed Flames
- 5 Spontaneous Ignition
- 6 Ignition of Liquids
- 7 Ignition of Solids
- 8 Fire Spread on Surfaces and Through Solid Media
- 9 Burning Rate
- 10 Fire Plumes
- 11 Compartment Fires
- 12 Scaling and Dimensionless Groups

## **Fundamentals of Premixed Turbulent Combustion, Andrei Lipatnikov**

出版信息: Taylor & Francis Group, LLC, 1<sup>st</sup> Edition, 2012 年

说明:

目录:

- 1 General Knowledge on Reacting Gas Mixtures
- 2 Unperturbed Laminar Premixed Flame
- 3 A Brief Introduction to Turbulence
- 4 Phenomenology of Premixed Turbulent Combustion
- 5 Physical Mechanisms and Regimes of Premixed Turbulent Combustion
- 6 Influence of Premixed Combustion on Turbulence.
- 7 Modeling of Premixed Burning in Turbulent Flows
- 8 Introduction to Nonpremixed Combustion
- 9 Partially Premixed Turbulent Flames

## **Fundamentals of Turbulent and Multiphase Combustion, Kenneth Kuo-yun Kuo, Ragini Acharya**

出版信息: John Wiley & Sons, Inc., 1<sup>st</sup> Edition, 2012 年

来自该书前言: “Due to these ongoing developments and advancements, theoretical modeling and numerical simulation hold great potential for future solutions of problems. In these two new books, we have attempted to integrate the fundamental theories of turbulence, combustion, and multiphase phenomena as well as experimental techniques, so that readers can acquire a firm background in both contemporary and classical approaches. The first book volume is called *Fundamentals of Turbulent and Multiphase Combustion*; the second is called *Applications of Turbulent and Multiphase Combustion*. The first volume can serve as a graduate-level textbook that covers the area of turbulent combustion and multiphase reacting flows as well as material that builds on these fundamentals. This volume also can be useful for research purpose. It is oriented toward the theories of combustion, turbulence, multiphase flows, and turbulent jets. Whenever appropriate, experimental setups and results are provided.”。

目录:

- 1 Fundamentals of Turbulent and Multiphase Combustion
- 2 Laminar Premixed Flames
- 3 Laminar Non-Premixed Flames
- 4 Background in Turbulent Flows
- 5 Turbulent Premixed Flames
- 6 Non-premixed Turbulent Flames
- 7 Background in Multiphase flows with Reactions
- 8 Spray Atomization and Combustion
- Appendix A: Useful Vector and Tensor Operations
- Appendix B: Constants and Conversion Factors Often Used in Combustion
- Appendix C: Naming of Hydrocarbons
- Appendix D: Detailed Gas-Phase Reaction Mechanism for Aromatics Formation
- Appendix E: Particle Size–U.S. Sieve Size and Tyler Screen MeshnEquivalents

## **Gas-Phase Combustion Chemistry, W. C. Gardiner Jr. (editor)**

出版信息: Springer, 2<sup>ed</sup> Edition, 2000 年

说明:

目录:

1 Combustion Chemistry Modeling

2 Combustion Chemistry of Nitrogen

3 Kinetics and Mechanisms of the Oxidation of Gaseous Sulfur Compounds

4 Survey of Rate Coefficients in the C-H-Cl-O System

5 Ideal Gas Thermochemical Data for Combustion and Air Pollution Use



## **Gas Turbine Combustion: Alternative Fuels and Emissions, Arthur H.**

**Lefebvre, Dilip R. Ballal**

出版信息: Taylor and Francis Group, LLC, 3<sup>rd</sup> Edition, 2010 年

该书前言提及: “The book has a clear purpose; it is directed primarily toward those who design, manufacture, and operate gas turbines in applications ranging from aeronautical to power generation. It serves as a graduate-level textbook, design manual, and research reference in the field of gas turbine combustion. The text is essentially self-contained and assumes only a modest prior knowledge of physics and chemistry”。

目录:

- 1 Basic Considerations
- 2 Combustion Fundamentals
- 3 Diffusers
- 4 Aerodynamics
- 5 Combustion Performance
- 6 Fuel Injection
- 7 Combustion Noise
- 8 Heat Transfer
- 9 Emissions
- 10 Alternative Fuels

## **Internal Combustion Engine Fundamentals, John B.LHeywood**

出版信息：McGraw-Hill, 1<sup>st</sup> Edition, 1988 年

说明：内燃机燃烧学经典教材。

目录：

- 1 Engine Types and Their Operation
- 2 Engine Design and Operating Parameters
- 3 Thermochemistry of Fuel-Air Mixtures
- 4 Properties of Working Fluids
- 5 Ideal Models of Engine Cycles
- 6 Gas Exchange Processes
- 7 SI Engine Fuel Metering and Manifold Phenomena
- 8 Charge Motion within the Cylinder
- 9 Combustion in Spark-Ignition Engines
- 10 Combustion in Compression-Ignition Engines
- 11 Pollutant Formation and Control
- 12 Engine Heat Transfer
- 13 Engine Friction and Lubrication
- 14 Modeling Real Engine Flow and Combustion Processes
- 15 Engine Operating Characteristics

## **Introduction to Physics and Chemistry of Combustion: Explosion, Flame, Detonation, Michael Liberman**

出版信息: Springer, 1<sup>st</sup> Edition, 2008 年

说明:

目录:

- 1 Introduction to Physics and Chemistry of Combustion
- 2 Chemical Thermodynamics
- 3 Combustion Chemistry
- 4 Self-Accelerating Reactions, Explosions
- 5 Velocity and Temperature of Laminar Flames
- 6 Introduction to Hydrodynamics of Ideal Fluids
- 7 Energy Dissipation in Gases and Liquids
- 8 Detonation and Shock Waves.
- 9 Hydrodynamics of Propagating Flame.
- 10 Regimes of Premixed Flames
- 11 Internal Combustion Engines
- 12 Combustion and Environmental Concerns
- Appendix A: Conversion Formulas and Constants.
- Appendix B: Useful Formulas of Vector Analysis
- Appendix C: Equations of Fluid Mechanics in Curvilinear Coordinate Systems

## **Irreversible Phenomena: Ignitions, Combustion and Detonation Waves,**

**Kunio Terao**

出版信息: Springer, 1<sup>st</sup> Edition, 2007 年

说明:

目录:

- 1 Introduction
- 2 Classical Ignition Theories
- 3 Stochastic Theory of Irreversible Phenomena
- 4 Nucleation in Phase Transition
- 5 Shock Tubes
- 6 Stochastic Ignition Theory
- 7 Ignition in a Fuel Spray
- 8 Ignition by Electric Sparks
- 9 Nonequilibrium State
- 10 Interaction Between Combustion and Pressure or Shock Waves
- 11 Gaseous Detonation Waves
- 12 Industrial Applications of Detonation Waves

## **Lectures on Mathematical Combustion, J.D. Buckmaster, G.S.S. Ludford**

出版信息: The Universities Press (Belfast) Ltd of Northern Ireland, 1<sup>st</sup> Edition, 1983 年

说明: 应用数学家写的燃烧专著。

目录:

- 1 Pro-Asymptotics Combustion Revisited
- 2 Governing Equations, Asymptotics, and Deflagrations
- 3 General Deflagrations
- 4 SVFs and NEFs
- 5 Stability of The Plane Deflagration Wave
- 6 Cellular Flames
- 7 Pulsating Flames
- 8 Counterflow Diffusion Flames
- 9 Spherical Diffusion Flames
- 10 Free-Boundary Problems

## **Nonsteady Flame Propagation, George Markstein**

出版信息: Pergamon Press, 1<sup>st</sup> Edition, 1964 年

说明:

目录:

- A. Introduction
- B. Theory of Flame Propagation
- C. Perturbation Analysis of Stability and Response of Plane Flame Fronts
- D. Experimental Studies of Flame-Front Instability
- E. Flame Propagation in Tubes and in Closed Vessels
- F. General Considerations of Autonomous Combustion Oscillations
- G. Experimental and Theoretical Studies of Combustion Oscillations
- H. Practical Considerations of Combustion Oscillations
- I. Conclusion

## **Numerical Simulation of Reactive Flow, Elaine S. Oran, Jay P. Boris**

出版信息: Cambridge University Press, 2<sup>nd</sup> Edition, 2001 年

说明: 燃烧数值模拟方面的专著。

目录:

- 1 An Overview of Numerical Simulation
- 2 The Reactive-Flow Modeling Problem
- 3 Models and Simulation
- 4 Some General Numerical Considerations
- 5 Ordinary Differential Equations: Reaction Mechanisms and Other Local Phenomena
- 6 Representations, Resolution, and Grids
- 7 Diffusive Transport Processes
- 8 Computational Fluid Dynamics: Continuity Equations
- 9 Computational Fluid Dynamics: Using More Flow Physics
- 10 Boundaries, Interfaces, and Implicit Algorithms
- 11 Coupling Models of Reactive-Flow Processes
- 12 Turbulent Reactive Flows
- 13 Radiation Transport and Reactive Flows

## **Principles of Combustion, Kenneth Kuan-yun Kuo**

出版信息: John Wiley & Sons, Inc., 2<sup>nd</sup> Edition, 2005 年

说明: 内含非常详细燃烧基本概念介绍以及控制方程推导与总结。有中文翻译版, 适合本科生课程。

目录:

0 Introduction

1 Review of Chemical Thermodynamics

2 Chemical Kinetics and Reaction Mechanisms

3 The Conservation Equations for Multicomponent Reacting Systems

4 Detonation and Deflagration Waves of Premixed Gases

5 Premixed Laminar Flames

6 Gaseous Diffusion Flames and Combustion of Single Liquid Fuel Droplet



## **Radiative Heat Transfer in Turbulent Combustion Systems: Theory and Applications, Michael F. Modest**

出版信息: Springer, 1<sup>st</sup> Edition, 2016 年

说明: 燃烧热辐射方面的专著。

目录:

- 1 Introduction
- 2 Chemically Reacting Turbulent Flows
- 3 Radiation Properties, RTE Solvers, and TRI Models
- 4 Radiation Effects in Laminar Flames
- 5 DNS and LES of Turbulence-Radiation Interactions in Canonical Systems
- 6 Turbulence-Radiation Interactions in Atmospheric Pressure Turbulent Flam
- 7 Radiative Heat Transfer in High-Pressure Combustion Systems
- 8 Summary, Conclusions, and Future Prospects

## **The Detonation Phenomenon, John H. S. Lee**

出版信息：Cambridge University Press, 1<sup>st</sup> Edition, 2008 年

说明：爆轰方面的专著，有中文翻译版（由林志勇、吴海燕及林伟翻译，国防工业出版社出版）。

目录：

- 1 Introduction
- 2 Gasdynamic Theory of Detonations and Deflagrations
- 3 Dynamics of Detonation Products
- 4 Laminar Structure of Detonations
- 5 Unstable Detonations: Numerical Description
- 6 Unstable Detonations: Experimental Observations
- 7 Influence of Boundary Conditions
- 8 Deflagration-to-Detonation Transition
- 9 Direct Initiation of Detonations

## **The Gas Dynamics of Explosions, John H. S. Lee**

出版信息: Cambridge University Press, 1<sup>st</sup> Edition, 2016 年

说明:

目录:

- 1 Basic Equations
- 2 Weak Shock Theory
- 3 Shock Propagation in a Non-uniform Cross-sectional Area Tube
- 4 Blast Wave Theory
- 5 Homentropic Explosions
- 6 The Snow-Plow Approximation
- 7 The Brinkley-Kirkwood Theory
- 8 Non-similar Solutions for Finite Strength Blast Waves
- 9 Implosions

## **The Mathematical Theory of Combustion Explosions, Ya. B. Zel'dovich**

出版信息: New York : Consultants Bureau, 1<sup>st</sup> Edition, 1985 年

说明: 燃烧经典专著。

目录:

- 1 Introduction. Foundations of the Science of Combustion: Basic Physical Concepts
- 2 The Time-independent Theory of Thermal Explosions
- 3 The Initiation of Chemical Reaction Waves in Fuel Mixtures: Time-dependent Statements of the Problem
- 4 Laminar Flames
- 5 Complex and Chain Reactions in Flames
- 6 The Gas Dynamics of Combustion
- 7 Diffusional Combustion of Gases

## **Theoretical and Numerical Combustion, Thierry Poinso, Denis Veynante**

出版信息: R.T. Edwards, Inc., 2<sup>nd</sup> Edition, 2012 年

说明: 研究生燃烧课教材。

目录:

- 1 Conservation equations for reacting flows
- 2 Laminar premixed flames
- 3 Laminar diffusion flames
- 4 Introduction to turbulent combustion
- 5 Turbulent premixed flames
- 6 Turbulent non-premixed flames
- 7 Flame/wall interactions
- 8 Flame/acoustics interactions
- 9 Boundary conditions
- 10 Examples of LES applications

## **Theory of Laminar Flames, J.D. Buckmaster, G. S. S. Ludford**

出版信息: Cambridge University Press, 1<sup>st</sup> Edition, 2008 年

说明: 由应用数学家写的燃烧专著。

目录:

- 1 Governing equations of combustion
- 2 The premixed plane flame
- 3 Perturbations: SVFs and NEFs
- 4 Steady burning of a linear condensate
- 5 Unsteady burning of a linear condensate
- 6 Spherical diffusion flames
- 7 Cylindrical and spherical premixed flames
- 8 Multidimensional theory of premixed flames
- 9 Burners
- 10 Effects of shear and strain
- 11 Stability
- 12 Ignition and explosion

## **Transport Processes in Chemically Reacting Flow Systems, Daniel E.**

**Rosner**

出版信息: Dover Publications, Inc., 2<sup>nd</sup> Edition, 2000 年

说明: 输运方面的专著。

目录:

- 1 Introduction to Transport Processes in Chemically Reactive Systems
- 2 Governing Conservation Principles
- 3 Constitutive laws: The Diffusion Flux laws and Their Coefficients
- 4 Momentum Transport Mechanisms, Rates, and Coefficients
- 5 Energy Transport Mechanisms, Rates, and Coefficients
- 6 Mass Transport Mechanisms, Rates, and Coefficients
- 7 Similitude Analysis with Application to Chemically Reactive Systems-Overview of the Role of Experiment and Theory
- 8 Problem-Solving Techniques, Aids, Philosophy: Forced Convective Heat and Mass Transfer to a Tube in Cross-Flow

## **Turbulent Combustion, N. Peters**

出版信息: Cambridge University Press, 1<sup>st</sup> Edition, 2000 年

说明: 湍流燃烧经典专著。

目录:

- 1 Turbulent combustion: The state of the art
- 2 Premixed turbulent combustion
- 3 Nonpremixed turbulent combustion
- 4 Partially premixed turbulent combustion



## **Turbulent Combustion Modeling: Advances, New Trends and Perspectives, Tarek Echekki, Epaminondas Mastorakos**

出版信息: Springer, 1<sup>st</sup> Edition, 2011 年

说明:

目录:

- 1 The Role of Combustion Technology in the 21st Century
- 2 Turbulent Combustion: Concepts, Governing Equations and Modeling Strategies
- 3 The Flamelet Model for Non-Premixed Combustion
- 4 RANS and LES Modelling of Premixed Turbulent Combustion
- 5 The Conditional Moment Closure Model
- 6 Transported Probability Density Function Methods for Reynolds-Averaged and Large-Eddy Simulations
- 7 Multiple Mapping Conditioning: A New Modelling Framework for Turbulent Combustion
- 8 The Emerging Role of Multiscale Methods in Turbulent Combustion
- 9 Model Reduction for Combustion Chemistry
- 10 The Linear-Eddy Model
- 11 The One-Dimensional-Turbulence Model
- 12 Unsteady Flame Embedding
- 13 Adaptive Methods for Simulation of Turbulent Combustion
- 14 Wavelet Methods in Computational Combustion
- 15 Design of Experiments for Gaining Insights and Validating Modeling of Turbulent Combustion
- 16 Uncertainty Quantification in Fluid Flow
- 17 Computational Frameworks for Advanced Combustion Simulations
- 18 The Heterogeneous Multiscale Methods with Application to Combustion
- 19 Lattice Boltzmann Methods for Reactive and Other Flows

## **Turbulent Reacting Flows, P. A. Libby, F. A. Williams**

出版信息: Springer, 1<sup>st</sup> Edition, 1980 年

说明:

目录:

1 Fundamental Aspects

2 Practical Problems in Turbulent Reacting Flows

3 Turbulent Flows with Nonpremixed Reactants

4 Turbulent Flows with Premixed Reactants

5 The Probability Density Function (pdf) Approach to Reacting Turbulent Flows

6 Perspective and Research Topics

## **Unsteady Combustor Physics, Tim C. Lieuwen**

出版信息：Cambridge University Press, 1<sup>st</sup> Edition, 2012 年

说明：有中文翻译版（由孙明波和樊超翻译，国防工业出版社出版）

目录：

- 1 Overview and Basic Equations
- 2 Decomposition and Evolution of Disturbances
- 3 Hydrodynamic Flow Stability I: Introduction
- 4 Hydrodynamic Flow Stability II: Common Combustor Flow Fields
- 5 Acoustic Wave Propagation I - Basic Concepts
- 6 Acoustic Wave Propagation II – Heat Release, Complex Geometry, and Mean Flow Effects
- 7 Flame-Flow Interactions
- 8 Ignition
- 9 Internal Flame Processes
- 10 Flame Stabilization, Flashback, Flameholding, and Blowoff
- 11 Forced Response I - Flamelet Dynamics
- 12 Forced Response II - Heat Release Dynamics

## 高等车用内燃机原理（下册），蒋德明，陈长佑，杨嘉林，杨中极

出版信息：西安交通大学出版社，2006 年

说明：该书前言提到：“上册以提高内燃机性能为中心，重点介绍近期国内外在提高内燃机整体性能方面的先进技术和正在研究的热点问题，比较侧重于实用。...下册重点介绍与内燃机燃烧和有害排放物生成机理有关的基础化学和物理问题及其应用，比较侧重于理论方面的深入探讨”。

目录：

### 第二篇 燃烧和排放物生成的化学基础

- 10 热化学
- 11 化学平衡
- 12 化学动力学
- 13 火焰的物理化学过程
- 14 燃料和燃烧化学反应
- 15 燃烧的简化化学动力学模型
- 16 氮氧化物的合成和分解
- 17 碳烟生成

### 第三篇 燃烧的物理基础

- 18 控制方程
- 19 层流预混燃烧火焰
- 20 层流扩散火焰
- 21 湍流燃烧导论
- 22 湍流预混火焰
- 23 湍流非预混火焰
- 24 液体燃料的蒸发
- 25 内燃机的燃烧

## 高等燃烧学, 岑可法, 姚强, 骆仲泐, 李绚天

出版信息: 浙江大学出版社, 2002 年

说明:

目录:

- 1 导论及化学动力学基础
- 2 燃料的着火理论
- 3 火焰传播与稳定的理论
- 4 湍流燃烧理论及模型
- 5 液体燃料的燃烧
- 6 煤的热解及挥发分的燃烧
- 7 煤的着火理论
- 8 煤的燃烧理论 (碳及煤焦的燃烧)
- 9 煤粉燃烧的数学模型
- 10 燃烧过程中硫的反应动力学及燃烧的固硫机理
- 11 燃烧过程中氮氧化物的生成及分解机理
- 12 燃烧过程中碳黑形成机理
- 13 催化燃烧原理
- 14 非线性理论在燃烧领域中的应用

## 极度燃烧，范宝春

出版信息：国防工业出版社，2018 年

说明：该书前言提到：“高马赫数、高雷诺数和高压高温下的燃烧称为极度燃烧(Extreme Combustion)”。

目录：

- 1 无黏流
- 2 简断
- 3 黏性流
- 4 湍流
- 5 燃烧
- 6 湍流燃烧
- 7 激波-火焰复合波
- 8 爆轰结构
- 9 爆轰推进

## 理论爆轰物理, 孙锦山, 朱建士

出版信息: 国防工业出版社, 1995 年

说明:

目录:

- 1 流体物理理论基础
- 2 反应流体力学与非平衡热力学基础
- 3 爆轰波的 CJ 理论
- 4 爆轰波的定常结构
- 5 爆轰波的稳定性研究
- 6 非定常爆轰波
- 7 凝聚态炸药的起爆机理
- 8 爆轰数值模拟的基础

## 燃烧理论和化学流体力学, 周力行

出版信息: 科学出版社, 1986 年

说明: 已经不再出版, 有电子版

目录:

### 0 引论

- 1 多组分反应流体的基本定律及基本方程
- 2 有放热反应流动系统中的临界现象——着火与灭火分析
- 3 有化学反应的一维流动——一维层流预混燃烧
- 4 有化学反应的球对称流动——液滴蒸发和燃烧
- 5 有化学反应的球对称流动——固体燃料颗粒燃烧
- 6 有化学反应的层流边界层流动
- 7 有化学反应的湍流射流
- 8 湍流流动及其中的化学反应——气体的湍流燃烧
- 9 有化学反应的多相流动——液雾和煤粉燃烧



## 燃烧理论与燃烧设备 徐旭常, 吕俊复, 张海

出版信息: 科学出版社, 2012 年

说明:

目录:

- 1 燃料、燃烧产物及热损失
- 2 燃烧的化学动力学基础
- 3 燃烧的流体力学基础
- 4 气体燃料燃烧理论
- 5 气体燃料燃烧设备
- 6 液体燃料燃烧理论
- 7 液体燃料燃烧设备
- 8 固体燃料燃烧理论
- 9 煤的层燃
- 10 煤的流化床燃烧
- 11 煤粉燃烧
- 12 煤的气化

## 燃烧学，傅维镛

出版信息：高等教育出版社，1989 年

说明：已经不再出版，有电子版

目录：

- 1 绪论
- 2 燃烧化学热力学和化学动力学基础
- 3 燃烧物理学基本方程
- 4 气体燃料及液滴的扩散燃烧
- 5 预混可燃气的层流燃烧
- 6 预混可燃气的湍流燃烧
- 7 着火与熄火
- 8 火焰稳定
- 9 液雾燃烧基础
- 10 煤的燃烧基础

## 燃烧学, 严传俊, 范玮

出版信息: 西北工业大学出版社, 第3版, 2016年

说明:

目录:

0 绪论

1 燃烧热力学

2 化学动力学

3 一维燃烧波

4 燃烧中的输运现象

5 多组分反应流体守恒方程

6 层流预混火焰传播

7 着火、可燃性和熄火

8 湍流预混火焰

9 非预混火焰

10 液体燃料的蒸发与燃烧

11 固体燃料的燃烧

12 燃烧产生的污染与防治

13 航空发动机中的燃烧

14 火箭发动机中的燃烧

15 超声速燃烧

16 爆震燃烧

17 脉动燃烧

18 内燃机中的燃烧

19 等离子体点火与助燃

20 燃烧诊断技术

21 燃烧过程数值模拟

## 湍流气粒两相流动和燃烧的理论及数值模拟, 周力行

出版信息: 科学出版社, 1994 年

说明:

目录:

第一篇 燃烧与气粒两相流动的基础

1 多组分有反应流动的基本方程

2 着火与灭火

3 层流预混燃烧

4 液滴和固体燃料颗粒燃烧

5 层流边界层中的燃烧

6 气粒两相流动

第二篇 湍流气粒两相流动与燃烧的模拟

7 单相湍流流动的模拟

8 湍流气粒两相流动的模拟

9 湍流气相与两相燃烧的模拟

10 工程装置中实际流动与燃烧过程的模拟