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Thermal to Mechanical Energy Conversion: Engines and Requirements is a component of Encyclopedia of Energy Sciences, Engineering and Technology Resources in the global Encyclopedia of Life Support Systems (EOLSS), which is an integrated compendium of twenty one Encyclopedias. The Theme on Thermal to Mechanical Energy Conversion: Engines and Requirements with contributions from distinguished experts in the field discusses energy. These three volumes are aimed at the following five major target audiences: University and College students Educators, Professional practitioners, Research personnel and Policy analysts, managers, and decision makers and NGOs.

This newly reissued debut book in the Rutgers University Press Classics Imprint is the story of the search for a rocket propellant which could be trusted to take man into space. This search was a hazardous enterprise carried out by rival labs who worked against the known laws of nature, with no guarantee of success or safety. Acclaimed scientist and sci-fi author John Drury Clark writes with irreverent and eyewitness immediacy about the development of the explosive fuels strong enough to negate the relentless restraints of gravity. The resulting volume is as much a memoir as a work of history, sharing a behind-the-scenes view of an enterprise which eventually took men to the moon, missiles to the planets, and satellites to outer space. A classic work in the history of science, and described as “a good book on rocket stuff...that’s a really fun one” by SpaceX founder Elon Musk, readers will want to get their hands on this influential classic, available for the first time in decades.

Liquid propellant rocket engines have propelled all the manned space flights, all the space vehicles flying to the planets or deep space, virtually all satellites, and the majority of medium range or intercontinental range ballistic missiles. This book, a translation of the French title Technologie des Propergols Solides, offers otherwise unavailable information on the subject of solid propellants and their use in rocket propulsion. The fundamentals of rocket propulsion are developed in chapter one and detailed descriptions of concepts are covered in the following chapters. Specific design methods and the theoretical physics underlying them are presented, and finally the industrial production of the propellant itself is explained. The material used in the book has been collected from different countries, as the development of this field has occurred separately due to the classified nature of the subject. Thus the reader not only has an overall picture of solid rocket propulsion technology but a comprehensive view of its different developmental permutations worldwide.

The book follows a unified approach to present the basic principles of rocket propulsion in concise and lucid form. This textbook comprises of ten chapters ranging from brief introduction and elements of rocket propulsion, aerothermodynamics to solid, liquid and hybrid propellant rocket engines with chapter on electrical propulsion. Worked out examples are also provided at the end of chapter for understanding uncertainty analysis. This book is designed and developed as an introductory text on the fundamental aspects of rocket propulsion for both undergraduate and graduate students. It is also aimed towards practicing engineers in the field of space engineering. This comprehensive guide also provides adequate problems for audience to understand intricate aspects of rocket propulsion enabling them to design and develop rocket engines for peaceful purposes.

David Altman, James M. Carter, S. S. Penner, Martin Summerfield. High Temperature Equilibrium, Expansion
Processes, Combustion of Liquid Propellants, The Liquid Propellants Rocket Engine. Originally published in 1960. The Princeton Legacy Library uses the latest print-on-demand technology to again make available previously out-of-print books from the distinguished backlist of Princeton University Press. These editions preserve the original texts of these important books while presenting them in durable paperback and hardcover editions. The goal of the Princeton Legacy Library is to vastly increase access to the rich scholarly heritage found in the thousands of books published by Princeton University Press since its founding in 1905. Liquid Rocket and Propellants New York Times bestselling authors Bill Nye the Science Guy and Gregory Mone take middle-grade readers on a scientific adventure in the launch of an exciting new chapter book series, Jack and the Geniuses. The perfect combination to engage and entertain readers, the series features real-world science along with action and a mystery that will leave kids guessing until the end, making these books ideal for STEM education. In the series opener, Jack and the Geniuses: At The Bottom of The World, rocket propulsion, math, and magic all meet for a thrilling story set in Antarctica. For a chance to win the world’s biggest science contest, kids Jack, Ava, and Matt must travel to Antarctica for a prestigious science competition, but they find that all is not as it seems: A fellow scientist has gone missing, and so has any trace of her research. Could someone be trying to use her findings to win the contest? It’s up to Jack, Ava, and Matt to find the missing scientist and discover who’s behind it all—before it’s too late. Integrating real science facts with humor and suspense, and featuring an ensemble cast of loveable boy and girl characters, this uniquely engaging series is an irresistible chemical reaction for middle-grade readers. With easy-to-read language presented in a fun, motivating, and accessible way, this series opener is a great book for both inquisitive kids and reluctant readers. The book also includes information about the science discussed and used to solve the mystery, as well as a cool science project about density that kids can do at home or in the classroom. Bill Nye’s brand new talk show series for Netflix, “Bill Nye Saves the World” is set to launch in Spring 2017. The only comprehensive text available on space propulsion for students and professionals in astronautics. This is a new release of the original 1960 edition. Solid Propellant Rocket Research This book intends to build a bridge for the student and the young engineer: to link the rocket propulsion fundamentals and elements with the actual rocket engine design and development work as it is carried out in the industry. The book also shows the reader step-by-step how to gain an understanding of the process of developing a rocket motor, and to help avoid technical mistakes and time and money consuming errors and disappointments. This book was written "on the job" for use by those active in all phases of engine systems, design, development, and application, in industry. This book contains chapters on nanocomposites for engineering hard materials for high performance aircraft, rocket and automobile use, using laser pulses to form metal coatings on glass and quartz, and also tungsten carbide-cobalt nanoparticles using high voltage discharges. A major section of this book is largely devoted to chapters outlining and applying analytic methods needed for studies of nanocomposites. As such, this book will serve as good resource for such analytic methods. Widely known and used throughout the astrodynamics and aerospace engineering communities, this teaching text was developed at the U.S. Air Force Academy. Completely revised and updated 2013 edition. The definitive text on rocket propulsion—now revised to reflect advancements in the field For sixty years, Sutton’s Rocket Propulsion Elements has been regarded as the single most authoritative sourcebook on rocket propulsion technology. As with the previous edition, coauthored with Oscar Biblarz, the Eighth Edition of Rocket Propulsion Elements offers a thorough introduction to basic principles of rocket propulsion for guided missiles, space flight, or satellite flight. It describes the physical mechanisms and designs for various types of rockets and provides an understanding of how rocket propulsion is applied to flying vehicles. Updated and strengthened throughout, the Eighth Edition explores: The fundamentals of rocket propulsion, its essential technologies, and its key design rationale The various types of rocket propulsion systems, physical phenomena, and essential relationships The latest advances in the field such as changes in materials, systems design, propellants, applications, and manufacturing technologies, with a separate new chapter devoted to turbopumps Liquid propellant rocket engines and solid propellant rocket motors, the two most prevalent of the rocket propulsion systems, with in-depth consideration of advances in hybrid rockets and electrical space propulsion Comprehensive and coherently organized, this seminal text guides readers evenhandedly through the complex factors that shape rocket propulsion, with both theory and practical design considerations. Professional engineers in the aerospace and defense industries as well as students in mechanical and aerospace engineering will find this updated classic indispensable for its scope of coverage and utility. A thriller of war that never was—of survival in an impossible city—of surreal cataclysm. In The Last Days of New Paris, China Miéville entwines true historical events and people with his daring, uniquely imaginative brand of fiction, reconfiguring history and art into something new. “Beauty will be convulsive. . . . “ 1941. In the chaos of wartime Marseille, American engineer—and occult disciple—Jack Parsons...
stumbles onto a clandestine anti-Nazi group, including Surrealist theorist André Breton. In the strange games of the dissident diplomats, exiled revolutionaries, and avant-garde artists, Parsons finds and channels hope. But what he unwittingly unleashes is the power of dreams and nightmares, changing the war and the world forever. 1950. A lone Surrealist fighter, Thibaut, walks a new, hallucinogenic Paris, where Nazis and the Resistance are trapped in unending conflict, and the streets are stalked by living images and—tand by the forces of Hell. To escape the city, he must join forces with Sam, an American photographer intent on recording the ruins, and make common cause with a powerful, enigmatic figure of chance and rebellion: the exquisite corpse. But Sam is being hunted. And new secrets will emerge that will test all their loyalties—to each other, to Paris old and new, and to reality itself. Praise for The Last Days of New Paris “Beautiful, stunningly realized . . . The Last Days of New Paris is a brief vacation in alien latitudes, a midnight layover in an imaginary place.”—NPR “A thoughtful, highbrow novella . . . Miéville’s self-assured style offers up a strong sense of humanity, while the strange Surrealist monsters give the story a fun and quirky touch as the main component.”—USA Today “[A] testament to the necessary, progressive power of art . . . Both moving and disturbingly timely.”—The Millions “A novel both unhinged and utterly compelling, a kind of guerrilla warfare waged by art itself, combining both meticulous historical research and Miéville’s unparalleled inventiveness.”—Chicago Tribune “An extraordinarily original work that foregrounds Mieville’s considerable ingenuity and innovation.”—The Millions “Hauntingly poetic, strangely beautiful, and erratically intense.”—San Francisco Book Review “Dazzling . . . quite a feat.”—The GuardianReaders of this book will be able to: utilize the fundamental principles of fluid mechanics and thermodynamics to analyze aircraft engines, understand the common gas turbine aircraft propulsion systems and be able to determine the applicability of each, perform system studies of aircraft engine systems for specified flight conditions, perform preliminary aerothermal design of turbomachinery components, and conceive, analyze, and optimize competing preliminary designs for conventional and unconventional missions. Early coverage of cycle analysis provides a systems perspective, and offers context for the chapters on turbomachinery and components Broader coverage than found in most other books - including coverage of propellers, nuclear rockets, and space propulsion - allows analysis and design of more types of propulsion systems In depth, quantitative treatments of the components of jet propulsion engines provides the tools for evaluation and component matching for optimal system performance Worked examples and end of chapter exercises provide practice for analysis, preliminary design, and systems integrationAnnotation Since the invention of the V-2 rocket during World War II, combustion instabilities have been recognized as one of the most difficult problems in the development of liquid propellant rocket engines. This book is the first published in the United States on the subject since NASA’s Liquid Rocket Combustion Instability (NASA SP-194) in 1972. In this book, experts cover four major subject areas: engine phenomenology and case studies, fundamental mechanisms of combustion instability, combustion instability analysis, and engine and component testing. Especially noteworthy is the inclusion of technical information from Russia and China--a first.This is a textbook about rocket engineering, concentrating on the nitrous oxide hybrid rocket engine, both small and large. It’s also a book about the science of chemical rockets in detail: three of the chapters are full of in-depth rocket science describing how all chemical rockets work. After a first chapter brushing up on the science and maths you’ll need, the book describes the choice and safe use of hybrid rocket propellants, and how they’re handled in practice. Then there are the rocket science chapters. Then you learn how to design, construct, and operate, a large hybrid rocket engine capable of getting you into Space. The book also includes a practical guide to the testing of hybrid rocket engines large and small, and how to fly them safely. Included are full instructions for programming a rocket trajectory simulator in Microsoft Excel, and several appendices containing rocketry information and equations, and instructions on how to design a bell nozzle.Introduces advanced mathematical tools for the modeling, simulation, and analysis of chemical non-equilibrium phenomena in combustion and flows, following a detailed explanation of the basics of thermodynamics and chemical kinetics of reactive mixtures. Researchers, practitioners, lecturers, and graduate students will find this work valuable. The book follows a unified approach to present the basic principles of rocket propulsion in concise and lucid form. This textbook comprises of ten chapters ranging from brief introduction and elements of rocket propulsion, aerothermodynamics to solid, liquid and hybrid propellant rocket engines with chapter on electrical propulsion. Worked out examples are also provided at the end of chapter for understanding uncertainty analysis. This book is designed and developed as an introductory text on the fundamental aspects of rocket propulsion for both undergraduate and graduate students. It is also aimed towards practicing engineers in the field of space engineering. This comprehensive guide also provides adequate problems for audience to understand intricate aspects of rocket propulsion enabling them to design and develop rocket engines for peaceful purposes. Rocket and air-breathing propulsion systems are the foundation on which planning for future aerospace systems rests. A Review of United States Air Force and Department of Defense Aerospace Propulsion Needs assesses the existing technical base in these areas and examines the future Air Force capabilities the base will be expected to support. This report also defines gaps and recommends where future warfighter capabilities not yet fully
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And
defined could be met by current science and technology development plans. This is the first book to cover development and testing practices for liquid rocket engines in Russia and the former Soviet Union. During the last decade, rapid growth of knowledge in the field of jet, rocket, nuclear, ion and electric propulsion has resulted in many advances useful to the student, engineer and scientist. The purpose for offering this course is to make available to them these recent advances in theory and design. Accordingly, this course is organized into seven parts: Part 1 Introduction; Part 2 Jet Propulsion; Part 3 Rocket Propulsion; Part 4 Nuclear Propulsion; Part 5 Electric and Ion Propulsion; Part 6 Theory on Combustion, Detonation and Fluid Injection; Part 7 Advanced Concepts and Mission Applications. It is written in such a way that it may easily be adopted by other universities as a textbook for a one semester senior or graduate course on the subject. In addition to the undersigned who served as the course instructor and wrote Chapter 1, 2 and 3, guest lecturers included: DR. G. L. DUGGER who wrote Chapter 4 "Ram-Jets and Air-Augmented Propulsion"; DR. GEORGE P. SUTTON who wrote Chapter 5 "Ram-Jets and Combustion Chambers"; DR. MARTIN SUMMERFIELD who wrote Chapter 6 "Solid Propellant Rockets," DR. HOWARD S. SEIFERT who wrote Chapter 7 "Hybrid Rockets," DR. CHANDLER C. Ross who wrote Chapter 8 "Advanced Nuclear Rocket Design," MR. GEORGE H. MCLAFFERTY who wrote Chapter 9 "Gaseous Nuclear Rockets," DR. S. G. FORBES who wrote Chapter 10 "Electric and Ion Propulsion," DR. R. H. BODEN who wrote Chapter 11 "Ion Propulsion," DR. Under NASA Glenn Research Center sponsorship, MIT has developed the concept of micromachined, bipropellant, liquid rocket engines. This is potentially a breakthrough technology changing the cost-performance tradeoffs for small propulsion systems, enabling new applications, and redefining the meaning of the term low-cost-access-to-space. With this NASA support, a liquid-cooled, gaseous propellant version of the thrust chamber and nozzle was designed, built, and tested as a first step. DARPA is currently funding MIT to demonstrate turbopumps and controls. The work performed herein was the second year of a proposed three-year effort to develop the technology and demonstrate very high power density, regeneratively cooled, liquid bipropellant rocket engine thrust chamber and nozzles. When combined with the DARPA turbopumps and controls, this work would enable the design and demonstration of a complete rocket propulsion system. The original MIT-NASA concept used liquid oxygen-ethanol propellants. The military applications important to DARPA imply that storable liquid propellants are needed. Thus, MIT examined various storable propellant combinations including N2O4 and hydrazine, and H2O2 and various hydrocarbons. The latter are preferred since they do not have the toxicity of N2O4 and hydrazine. In reflection of the newfound interest in H2O2, it is once again in production and available commercially. A critical issue for the microrocket engine concept is dynamics, and is incorporated into the volume in a well-organized, cohesive manner. There are contributions from nine different countries: China, France, Germany, Italy, Japan, the Netherlands, Russia, Sweden, and the United States. This book is intended for students and engineers who define and design liquid-propellant rocket engines, offering them a guide to the theory and practice alike. It first presents the fundamental concepts (the generation of thrust, the gas flow through the combustion chamber and nozzle, the liquid propellants used, and the combustion process) and then qualitatively and quantitatively describes the principal components involved (the combustion chamber, nozzle, feed systems, control systems, valves, propellant tanks, and interconnecting elements). The book includes extensive data on existing engines, typical values for design parameters, and worked-out examples of how the concepts discussed can be applied, helping readers integrate them in their own work. Detailed bibliographical references (including books, articles, and items from the “gray literature”) are provided at the end of each chapter.
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And
together with information on valuable resources that can be found online. Given its scope, the book will be of particular interest to undergraduate and graduate students of aerospace engineering. This report evaluates twenty-two ablative-material samples as nozzle sections of a storable-propellant (nitrogen tetroxide and a 50-50 percent blend of unsymmetrical dimethylhydrazine with hydrazine) rocket engine to determine general trends among the material variables and to enable comparison of such trends with those observed from similar tests with a hydrogen-oxygen rocket engine reported in NASA TN D-3258. A modern pedagogical treatment of the latest industry trends in rocket propulsion, developed from the authors' extensive experience in both industry and academia. Students are guided along a step-by-step journey through modern rocket propulsion, beginning with the historical context and an introduction to top-level performance measures, and progressing on to in-depth discussions of the chemical aspects of fluid flow combustion thermochemistry and chemical equilibrium, solid, liquid, and hybrid rocket propellants, mission requirements, and an overview of electric propulsion. With a wealth of homework problems (and a solutions manual for instructors online), real-life case studies and examples throughout, and an appendix detailing key numerical methods and links to additional online resources, this is a must-have guide for senior and first year graduate students looking to gain a thorough understanding of the topic along with practical tools that can be applied in industry.