Mars Lander

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Discusses planetary protection issues for the Russian Mars '94 mission, as well as for future Mars lander missions including the planned Mars '96 and U.S. MESUR Pathfinder and Network missions. The topics summarized include exobiology science objectives for Mars exploration, current international policy on planetary protection, planetary protection requirements developed for earlier missions, mission plans and designs for future U.S. and Russian Mars landers, biological contamination of spacecraft components, and techniques for spacecraft bioload reduction. In addition, the recent recommendations of the U.S. Space Studies Board (SSB) were also summarized. One additional topic briefly considered was the identification of some issues related to planetary protection considerations for Mars sample return missions.

The firsthand account of the trials and tribulations of engineering one of the most complex pieces of space technology, the Mars Rover Curiosity, by its chief engineer Rob Manning In the course of our enduring quest for knowledge about ourselves and our universe, we haven't found answers to one of our most fundamental questions: Does life exist anywhere else in the universe? Ten years and billions of dollars in the making, the Mars Rover Curiosity is poised to answer this all-important question. In Mars Rover Curiosity: An Inside Account from Curiosity's Chief Engineer, Rob Manning, the project's chief engineer, tells of bringing the groundbreaking spacecraft to life. Manning and his team at NASA's Jet Propulsion Laboratory, tasked with designing a lander many times larger and more complex than any before, faced technical setbacks, fights over inadequate resources, and the challenges of leading an army of brilliant, passionate, and often frustrated experts. Manning's fascinating personal account--which includes information from his exclusive interviews with leading Curiosity scientists--is packed with tales of revolutionary feats of science, technology, and engineering. Readers experience firsthand the disappointment at encountering persistent technical problems, the agony of near defeat, the sense of victory at finding innovative solutions to these problems, the sheer terror of staking careers and reputations on a lander that couldn't be tested on Earth, and the rush of triumph at its successful touchdown on Mars on August 5, 2012. This is the story of persistence, dedication, and unrelenting curiosity.

India launched an unmanned orbiting to Mars in November 2013. Once the project got the approval of the government, it was readied in the shortest possible time and launched. So far it has been successful. If it succeeds in reaching Mars in September 2014, it will be the first Asian country to have been successful in the very first attempt itself. The flight has attracted worldwide interest, judging from the number of international correspondents who were present at Sriharikota for the launch. Called the Mars Orbiting Mission, or just MOM affectionately, it is equipped with five payloads, and their role is to study the Martian atmosphere and look for the elusive methane. There is also a Mars colour camera. The Indian Mars journey has been a topic of discussion at every level of Indian society, particularly among the younger generation. People would be interested in knowing after the mission was launched.

Mars is a small world with a big reputation. This mysterious, singular planet—with volcanoes that dwarf Mount Everest, a canyon system that would stretch fully across the United States, and curious landscapes that perhaps once harbored water—has fascinated us for centuries. In the most up-to-date account available of the elusive Red Planet, Stephen James O’Meara follows our longstanding love affair with this unique celestial body, from the musings of humanity’s first stargazers to the imaginings of science-fiction writers, radio broadcasters, and filmmakers, to the latest images and discoveries from the Curiosity rover. The book also reviews plans for piloted missions to Mars—and what it will take for those missions to succeed.

Discovering Mars
Manned Mars Lander Launch-to-rendezvous Analysis for a 1981 Venus-Swingby Mission
Exploring Mars
Radiometric Performance of the Viking Mars Lander Cameras
Mars Lander/Rover Vehicle Development
Mars Polar Lander Racing Toward Friday Rendezvous with Red Planet

Within the Office of Space Science of the National Aeronautics and Space Administration (NASA) special importance is attached to exploration of the planet Mars, because it is the most like Earth of the planets in the solar system and the place where the first detection of extraterrestrial life seems most likely to be made. The failures in 1999 of two NASA missions-Mars Climate Orbiter and Mars Polar Lander-caused the space agency's program of Mars exploration to be systematically rethought, both technologically and scientifically. A new Mars Exploration Program plan (summarized in Appendix A) was announced in October 2000. The Committee on Planetary and Lunar Exploration (COMPLEX), a standing committee of the Space Studies Board of the National Research Council, was asked to examine the scientific content of this new program. This goals of this report are the following: -Review the state of knowledge of the planet Mars, with special emphasis on findings of the most recent Mars missions and related research activities; -Review the most important Mars research opportunities in the immediate future; -Review scientific priorities for the exploration of Mars identified by COMPLEX (and other scientific advisory groups) and their motivation, and consider the degree to which recent discoveries suggest a reordering of priorities; and -Assess the congruence between NASA's evolving Mars Exploration Program plan and these recommended priorities, and suggest any adjustments that might be warranted.

In 1976, Viking 1 became the first spacecraft from Earth to land on Mars. For the first time, scientists were able to see the surface of the red planet! Since then, NASA and other space organizations have sent other probes to Mars and have learned a lot. Readers find out all about the robots created especially for the task of exploring Mars through detailed diagrams, full-color photographs, and interesting main content. Including information about STEM careers and the background of planning a space mission using robots, this book engages readers with exciting STEM content and careers.

Physics and Chemistry of the Solar System focuses on planetary physics and chemistry. This book consists of 12 chapters. Chapters I to IV cover the general properties and environment of the planetary system. The solar system beyond Mars is elaborated in Chapters V to VIII, while the inner solar system is considered in Chapters XI to XII. In these chapters, this compilation specifically discusses the limitations on big bang nucleosynthesis; structure and classification of galaxies; and mass and angular momentum distribution. The radio wave propagation in space plasmas; interiors of Jupiter and Saturn; density and composition of icy satellites; and evaporation and non-gravitational forces are also deliberated. This text also explains the physical properties of meteorites; geology of the Moon; geophysical data on Mars; and search for extraterrestrial intelligence. This publication is a good reference for first-year graduate students who intend to take graduate courses in specialized areas of planetary sciences, as well as practicing Ph.D. scientists with training in physics, chemistry, geology, astronomy, meteorology, and biology.

A description is given of the return of a manned Mars lander by a launch from the surface of Mars to some intermediate orbit, with subsequent maneuvers to rendezvous with a primary spacecraft (called the orbiter) in a Mars parking orbit. The type of Mars mission used to demonstrate the analytical technique includes a Venus swingby on the Mars-to-Earth portion of the trajectory in order to reduce the total mission velocity requirement. The total velocity requirement for the mission considered (if inplane launches are assumed) is approximately 17,500 ft/sec.

Robots Explore the Red Planet
Exploration of the Red Planet, 1958-1978
NASA Lunar Lander Concepts Beyond Apollo /
Mars Rover Curiosity
Water and the Search for Life on Mars
Mars Lander

Astronomy and Astrophysics Abstracts, which has appeared in semi-annual volumes since 1969, is de voted to the recording, summarizing and indexing of astronomical publications throughout the world. It is prepared under the auspices of the International Astronomical Union (according to a resolution adopted at the 14th General Assembly in 1970). Astronomy and Astrophysics Abstracts aims to present a comprehensive documentation of literature in all fields of astronomy and astrophysics. Every effort will be made to ensure that the average time interval between the date of receipt of the original literature and publication of the abstracts will not exceed eight months. This time interval is near to that achieved by monthly abstracting journals, com pared to which our system of accumulating abstracts for about six months offers the advantage of greater convenience for the user. Valurne 7 contains literature published in 1972 and received before August 15, 1972; some older liter ature which was received late and which is not recorded in earlier volumes is also included.

Soviet Robots in the Solar System provides a history of the Soviet robotic lunar and planetary exploration program from its inception, with the attempted launch of a lunar impactor on September 23, 1958, to the last launch in the Russian national scientific space program in the 20th Century, Mars 96, on November 16, 1996. This title makes a unique contribution to understanding the scientific and engineering accomplishments of the Soviet Union’s robotic space exploration enterprise from its infancy to its demise with the collapse of the Soviet Union. The authors provide a comprehensive account of Soviet robotic exploration of the Solar System for both popular space enthusiasts and professionals in the field. Technical details and science results are provided and put into an historical and political perspective in a single volume for the first time. The book is divided into two parts. Part I describes the key players and the key institutions that build and operate the hardware, the rockets that provide access to space, and the spacecraft that carry out the enterprise. Part II is about putting these pieces together to enable space flight and mission campaigns. Part II is written in chronological order beginning with the first launches to the Moon. Each chapter covers a particular period when

specific mission campaigns were undertaken during celestially-determined launch windows. Each chapter begins with a short overview of the flight missions that occurred during the time period and the political and historical context for the flight mission campaigns, including what the Americans were doing at the time. The bulk of each chapter is devoted to the scientific and engineering details of that flight campaign. The spacecraft and payloads are examined with as much technical detail as is available today, the progress is described, and a synopsis of the scientific result is given.

Results are presented from a wind-tunnel investigation of the flow field around a 0.45-scale model of a Mars lander. The tests were conducted in air at values of Reynolds number equivalent to those anticipated on Mars. The effects of Reynolds number equivalent to those anticipated on Mars. The effects of Reynolds number, model orientation with respect to the airstream, and the position of a dish-type antenna on the flow field were determined. An appendix is included which describes the calibration and operational characteristics of hot-film anemometers under simulated Mars surface conditions.

In the next decade, NASA, by itself and in collaboration with the European Space Agency, is planning a minimum of four separate missions to Mars. Clearly, exciting times are ahead for Mars exploration. This is an insider’s look into the amazing projects now being developed here and abroad to visit the legendary red planet. Drawing on his contacts at NASA and the Jet Propulsion Laboratory, the author provides stunning insights into the history of Mars exploration and the difficulties and dangers of traveling there. After an entertaining survey of the human fascination with Mars over the centuries, the author offers an introduction to the geography, geology, and water processes of the planet. He then briefly describes the many successful missions by NASA and others to that distant world. But failure and frustration also get their due. As the author makes clear, going to Mars is not, and never will be, easy. Later in the book, he describes in detail what each upcoming mission will involve. In the second half of the book, he offers the reader a glimpse inside the world of Earth-based "Mars analogs," places on Earth where scientists are conducting research in hostile environments that are eerily "Martian." Finally, he constructs a probable scenario of a crewed expedition to Mars, so that readers can see how earlier robotic missions and human Earth simulations will fit together. All this is punctuated by numerous firsthand interviews with some of the finest Mars explorers of our day, including Stephen Squyres (Mars Exploration Rover), Bruce Murray (former director of the Jet Propulsion Laboratory), and Peter Smith (chief of the Mars Phoenix Lander and the upcoming OSIRIS-REx missions). These stellar individuals give us an insider’s view of the difficulties and rewards of roaming the red planet. The author’s infectious enthusiasm and firsthand knowledge of the international space industry combine to make a uniquely appealing and accessible book about Mars.

Curiosity

Searching for Life on Another World

Mars Lander Propulsion

An Advanced Space Design Project for Usra and Nasa/Oast

Assessment of Mars Science and Mission Priorities

Indian Martian Odyssey

Describes Mars, the fourth planet closest to the sun in our solar system, and discusses how astronomers are studying it and why, and compares it to Earth.

Spirit (MER-A) – USA Mars Rover – 185 kg - (June 10, 2003) As part of the Mars Exploration Rover (MER) Mission, "Spirit", also known as MER-A, was launched on June 10, 2003 and successfully arrived on Mars on January 3, 2004. The last communication with Spirit occurred on March 22, 2010. JPL ended attempts to re-establish contact on May 25, 2011. The rover likely lost power due to excessively cold internal temperatures. Opportunity (MER-B) – USA Mars Rover – 185 kg - (July 7, 2003) "Opportunity", also known as MER-B, was launched on July 7, 2003 and successfully arrived on Mars on January 24, 2004. Click here for more information on the MER mission. Mars Reconnaissance Orbiter – USA Mars Orbiter - 1,031 kg - (August 12, 2005) The Mars Reconnaissance Orbiter (MRO) was launched on August 12, 2005 for a seven month voyage to Mars. MRO reached Mars in March 10, 2006 and began its scientific mission in November 2006. Click here for more information. Mars Science Laboratory – USA Mars Rover – 750 kg - (November 26, 2011) The Mars Science Laboratory was launched on November 26, 2011. With its rover named Curiosity, NASA's Mars Science Laboratory mission is designed to assess whether Mars ever had an environment able to support small life forms called microbes. Curiosity landed successfully in Gale Crater at 1:31 am EDT on August 6, 2012. Click here for more information from the NASA JPL site.

This book explores various perspectives surrounding the ongoing efforts to explore Mars and the men and women who work to better understand our solar system. Readers are immersed in the action as their choices guide the narrative.

“ Sarah Stewart Johnson interweaves her own coming-of-age story as a planetary scientist with a vivid history of the exploration of Mars in this celebration of human curiosity, passion, and perseverance. ” —Alan Lightman, author of Einstein ’ s Dreams WINNER OF THE PHI BETA KAPPA AWARD FOR SCIENCE • NAMED ONE OF THE BEST BOOKS OF THE YEAR BY The New York Times Book Review • Times (UK) • Library Journal “ Lovely . . . Johnson ’ s prose swirls with lyrical wonder, as varied and multihued as the apricot deserts, butterscotch skies and blue sunsets of Mars. ” —Anthony Doerr, The New York Times Book Review Mars was once similar to Earth, but today there are no rivers, no lakes, no oceans. Coated in red dust, the terrain is bewilderingly empty. And yet multiple spacecraft are circling Mars, sweeping over Terra Sabaea, Syrtis Major, the dunes of Elysium, and Mare Sirenum—on the brink, perhaps, of a staggering find, one that would inspire humankind as much as any discovery in the history of modern science. In this beautifully observed, deeply personal book, Georgetown scientist Sarah Stewart Johnson tells the story of how she and other researchers have scoured Mars for signs of life, transforming the planet from a distant point of light into a world of its own. Johnson ’ s fascination with Mars began as a child in Kentucky, turning over rocks with her father and looking at planets in the night sky. She now conducts fieldwork in some of Earth ’ s most hostile environments, such as the Dry Valleys of Antarctica and the salt flats of Western Australia, developing methods for detecting life on other worlds. Here, with poetic precision, she interlaces her own personal journey—as a female scientist and a mother—with tales of other seekers, from Percival Lowell, who was convinced that a utopian society existed on Mars, to Audouin Dollfus, who tried to carry out astronomical observations from a stratospheric balloon. In the process, she shows how the story of Mars is also a story about Earth: This other world has been our mirror, our foil, a telltale reflection of our own anxieties and yearnings. Empathetic and evocative, The Sirens of Mars offers an unlikely natural history of a place where no human

has ever set foot, while providing a vivid portrait of our quest to defy our isolation in the cosmos.

The Sirens of Mars

Mars As Art Series: Stories And Images From The Mars Reconnaissance Orbiter (MRO) And The Opportunity Rover

Landing Site Dispersions of an Uncontrolled Lander on Mars

Mars

Destination Mars

Mars Probes

This SpringerBrief explores the technological, economic, physiological, and psychological comparisons between a journey to the Moon versus a journey to Mars, taking into consideration the national and international perspectives at play. The author spent over six years interviewing leading space experts from around the world to learn why lunar habitats and the creation of a permanent presence on the Moon are an essential next step to human exploration and settlement in space. Practical reasons related to energy, telecommunications and networking, robotic systems, medical and scientific research, material processing, and more show why it must be the Moon First and Mars Second. These findings and recommendations have been adopted by current NASA Administrator Jim Bridenstine, as well as the current U. S. president. The research in this text reflects the author's experiences working internally within NASA Headquarters, the FAA Commercial Spaceflight Office, as well as the International Space University. It is partially based on Reneau ' s award-winning Harvard thesis in conjunction with her Master's in International Relations.

"Florida Today" presents the December 2, 1999 article "Mars Polar Lander Racing Toward Friday Rendezvous with Red Planet," written by Robyn Suriano. The article highlighted the planned December 1999 landing of the NASA Mars Polar Lander. The mission of the craft was to search for water on Mars.

A design is proposed for a Mars Lander/Rover (MLR) for use in gathering needed environmental and surface information. The design focus will be upon a Mars Lander/Rover that will leave an orbit around Mars, reenter and soft land on the Martian surface, and move sequentially to widely scattered locations to sample, measure, and analyze the Martian environmental and surface conditions. Primary goals will be payload mass and size definition, characterization of the Martian atmosphere, selection of sampling locations, identification of alternative design concepts, selection of a preferred design, team organization, and preparation for the detailed design phase. Unspecified Center NASA-CR-182570, NAS 1.26:182570 NGT-80001...

An award-winning science writer provides an inside look at the recent space mission of the Curiosity rover to Mars, describing the scientists who developed and remotely manned it and offering insights into the information and samples collected. Original.

New Explorations of the Red Planet

Mission Technologies and Discoveries

Stardust to Terrestrial and Extraterrestrial Planetary Sciences

India's Quest for the Red Planet

Moon First and Mars Second

A Computational Intelligence (CI) Approach to the Precision Mars Lander Problem

Exploration by space probes has revealed many fascinating details about Earth ' s planetary neighbours. Today we stand on the threshold of the next phase of planetary exploration and knowledge, with several space probe missions currently underway and others being planned. Probing the New Solar System discusses the latest findings that have contributed to a changed understanding of the solar system – and how the revised definition of a planet in 2006 by the International Astronomical Union affected this understanding. Each chapter includes some historical information, ' Did you know? ' items of particular interest to readers, and photographs of objects in the solar system showing newly discovered features of the planets, their moons and of dwarf planets. This is an up-to-date record of the many recent discoveries made about our solar system and other planetary systems using ground-based and space probe technology. It has been written for people interested in astronomy, both professional and amateur, as well as for students and educators.

Could life have previously flourished on Mars? Will humans be able to travel there one day? Can humans one day colonize the red planet? NASA scientists have been interested in answering questions like these for a long time. In November 2011, NASA sent the rover Curiosity to Earth's nearest planetary neighbor. By gathering information about Mars's climate and geology, the robot is helping scientists uncover the secrets of the planet and its past. Since its launch, Curiosity has made some amazing discoveries. The rover found an ancient streambed where water once flowed for thousands of years, and rock samples proved that the surface soil on Mars still has water! In addition, from drilling into Martian rock, the rover detected the key chemicals necessary for life?sulfur, nitrogen, hydrogen, oxygen, phosphorus, and carbon. And Curiosity's measurement of radiation on Mars shows levels similar to that at the International Space Station. These discoveries suggest that some parts of Mars could have been habitable?and may be again in the future. Learn more about the red planet and see what else Curiosity has uncovered!

Humanity has long been fascinated by the planet Mars. Was its climate ever conducive to life? What is the atmosphere like today and why did it change so dramatically over time? Eleven spacecraft have successfully flown to Mars since the Viking mission of the 1970s and early 1980s. These orbiters, landers and rovers have generated vast amounts of data that now span a Martian decade (roughly eighteen years). This new volume brings together the many new ideas about the atmosphere and climate system that have emerged, including the complex interplay of the volatile and dust cycles, the atmosphere-surface interactions that connect them over time, and the diversity of the planet's environment and its complex history. Including tutorials and explanations of complicated ideas, students, researchers and non-specialists alike are able to use this resource to gain a thorough and up-to-date understanding of this most Earth-like of planetary neighbours.

The objective of the book is to find an answer to the rationale behind the human quest for the Mars exploration. As a comprehensive assessment for this query is undertaken, it is realized that the basic question ' Why Mars? ' seeks various responses from technological, economic and geopolitical to strategic perspectives. The book is essentially targeted to understand India ' s desire to reach Mars. In the process, it also undertakes some implicit questioning of Mars programmes of various other states essentially to facilitate the setting up of the context for an assessment. The book is divided into two parts: Part I: This covers both science and politics associated with Mars missions in global scenario and discusses the salient features of various Mars Missions undertaken by various countries. Part II: This provides details in regards to India ' s Mars Mission.

Probing the New Solar System

Literature 1972, Part 1

Chronicles from a Decade of Discovery

Survivability of the Mars Lander

The Atmosphere and Climate of Mars

A History of Observation and Exploration of the Red Planet

As if Victor's life was normal. What was supposed to be a normal trip to go shopping, turned out to be a life-threatening adventure with cosmic cops, weird aliens, and out of this world things, which was not normal. So if you were wondering how Victor got into this mess, well then I'll tell you that he got sucked through a toilet to the city of YRUAPP, were he meets lots of friends and one dangerous villain. To find out what happens - read on!

The authors have put forth great efforts in gathering present day knowledge about different objects within our solar system and universe. This book features the most current information on the subject with information acquired from noted scientists in this area. The main objective is to convey the importance of the subject and provide detailed information on the physical makeup of our planetary system and technologies used for research. Information on

educational projects has also been included in the Radio Astronomy chapters.This information is a real plus for students and educators considering a career in Planetary Science or for increasing their knowledge about our planetary system.

For millenia humans have considered Mars the most fascinating planet in our solar system. We ' ve watched this Earth-like world first with the naked eye, then using telescopes, and, most recently, through robotic orbiters and landers and rovers on the surface. Historian William Sheehan and astronomer and planetary scientist Jim Bell combine their talents to tell a unique story of what we ' ve learned by studying Mars through evolving technologies. What the eye sees as a mysterious red dot wandering through the sky becomes a blurry mirage of apparent seas, continents, and canals as viewed through Earth-based telescopes. Beginning with the Mariner and Viking missions of the 1960s and 1970s, space-based instruments and monitoring systems have flooded scientists with data on Mars ' s meteorology and geology, and have even sought evidence of possible existence of life-forms on or beneath the surface. This knowledge has transformed our perception of the Red Planet and has provided clues for better understanding our own blue world. Discovering Mars vividly conveys the way our understanding of this other planet has grown from earliest times to the present. The story is epic in scope—an Iliad or Odyssey for our time, at least so far largely without the folly, greed, lust, and tragedy of those ancient stories. Instead, the narrative of our quest for the Red Planet has showcased some of our species ' most hopeful attributes: curiosity, cooperation, exploration, and the restless drive to understand our place in the larger universe. Sheehan and Bell have written an ambitious first draft of that narrative even as the latest chapters continue to be added both by researchers on Earth and our robotic emissaries on and around Mars, including the latest: the Perseverance rover and its Ingenuity helicopter drone, which set down in Mars ' s Jezero Crater in February 2021.

Provides a comprehensive account of the recent ' Spirit ' and ' Opportunity ' Mars Exploration Rover missions. Relates how NASA/ESA have sought evidence of life on Mars, with the prevailing mood sometimes being optimistic and sometimes pessimistic. Details an account of the rationale for the tests for life carried out by the Viking missions in 1976, with an account of the debate over their results. A concise primer for readers wishing to ' bone up ' when NASA next sends a lander explicitly to seek life on Mars. Discusses the nature of life on Mars in terms of the most primitive forms of life on Earth, and reviews the implications of there being life on both planets.

On Mars

An Inside Look at the Mars Rover Mission and the People who Made it Happen

A Practical Approach to Human Space Exploration

After LM

Soviet Robots in the Solar System

The Martian Landscape

Physics and Chemistry of the Solar System is a broad survey of the Solar System. The book discusses the general properties and environment of our planetary system, including the astronomical perspective, the general description of the solar system and of the sun and the solar nebula). The text also describes the solar system beyond mars, including the major planets; pluto and the icy satellites of the outer planets; the comets and meteors; and the meteorites and asteroids. The inner solar system, including the airless rocky bodies; mars, venus, and earth; and planets and life about other stars, is also encompassed. Mathematicians, chemists, physicists, geologists, astronomers, meteorologists, and biologists will find the book useful.

The Red Planet has been a subject of fascination for humanity for thousands of years, becoming part of our folklore and popular culture. The most Earthlike of the planets in our solar system, Mars may have harbored some form of life in the past and may still possess an ecosystem in some underground refuge. The mysteries of this fourth planet from our Sun make it of central importance to NASA and its science goals for the twenty-first century. Ê Ê In the wake of the very public failures of the Mars Polar Lander and the Mars Climate Orbiter in 1999, NASA embarked on a complete reassessment of the Mars Program. Scott Hubbard was asked to lead this restructuring in 2000, becoming known as the "Mars Czar." His team's efforts resulted in a very successful decade-long series of missions--each building on the accomplishments of those before it--that adhered to the science adage "follow the water" when debating how to proceed. Hubbard's work created the Mars Odyssey mission, the twin rovers Spirit and Opportunity, the Mars Reconnaissance Orbiter, the Phoenix mission, and most recently the planned launch of the Mars Science Laboratory. Ê Now for the first time Scott Hubbard tells the complete story of how he fashioned this program, describing both the technical and political forces involved and bringing to life the national and international cast of characters engaged in this monumental endeavor. Ê Blending the exciting stories of the missions with the thrills of scientific discovery, Exploring Mars will intrigue anyone interested in the science, the engineering, or the policy of investigating other worlds. Ê

This book provides systematic descriptions of design methods, typical techniques, and validation methods for lunar soft landers, covering their environmental design, system design, sub-system design, assembly, testing and ground test validation based on the Chang ' e-3 mission. Offering readers a comprehensive, systematic and in-depth introduction to the technologies used in China ' s lunar soft landers, it presents detailed information on the design process for Chang ' e-3, including methods and techniques that will be invaluable in future extraterrestrial soft lander design. As such, the book offers a unique reference guide for all researchers and professionals working on deep-space missions around the globe.

NASA's Mars Surveyor Program (MSP) began in 1994 with plans to send spacecraft to Mars every 26 months. Mars Global Surveyor (MGS), a global mapping mission, was launched in 1996 and is currently orbiting Mars. Mars Surveyor '98 consisted of Mars Climate Orbiter (MCO) and Mars Polar Lander (MPL). Lockheed Martin Astronautics (LMA) was the prime contractor for Mars Surveyor '98. The Jet Propulsion Laboratory (JPL), California Institute of Technology, manages the Mars Surveyor Program for NASA's Office of Space Science. MPL was developed under very tight funding constraints. The combined development cost of MPL and MCO, including the cost of the two launch vehicles, was approximately the same as the development cost of the Mars Pathfinder mission, including the cost of its single launch vehicle. The MPL project accepted the challenge to develop effective implementation methodologies consistent with programmatic requirements. Albee, Arden and Battel, Steven and Brace, Richard and Burdick, Garry and Casani, John and Lavell, Jeffrey and Leising, Charles and MacPherson, Duncan and Burr, Peter and Dipprey, Duane Jet Propulsion Laboratory; Langley Research Center

Report on the Loss of the Mars Polar Lander and Deep Space 2 Missions

Technology of Lunar Soft Lander

An Inside Account from Curiosity's Chief Engineer

Planetary Protection Implementation on Future Mars Lander Missions

Curiosity's Mission on Mars

Mission Mars

A Mars precision landing requires a landed footprint of no more than 100 meters. Obstacles to reducing the landed footprint include trajectory dispersions due to initial atmospheric entry conditions such as entry angle, parachute deployment height, environment parameters such as wind, atmospheric density, parachute deployment dynamics, unavoidable injection error or propagated error from launch, etc. Computational Intelligence (CI) techniques such as Artificial Neural Nets and Particle Swarm Optimization have been shown to have great success with other control problems. The research period extended previous work on investigating applicability of the computational intelligent approaches. The focus of this investigation was on Particle Swarm Optimization and basic Neural Net architectures. The research investigating these issues was performed for the grant cycle from 5/15/01 to 5/15/02. Matlab 5.1 and 6.0 along with NASA's POST were the primary computational tools. Birge, Brian and Walberg, Gerald Langley Research Center

An Interactive Space Exploration Adventure

Mars Exploration Rovers
Physics and Chemistry of the Solar System
Exploring the Red Planet
Solar Planetary Systems
Flow-field Measurements Around a Mars Lander Model Using Hot-film Anemometers Under Simulated Mars Surface Conditions