Bemannte Raumfahrt
– von ihren Anfängen zum Stand der Technik –

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April 2011

Zusammenfassung

Die Entwicklung der bemannten Raumfahrt wird anhand von der Darstellung wesentlicher Geschichte, Prinzipien, Ereignisse, Systeme und Missionen – vergangene, heutige und zukünftige – behandelt. Die Faszination der Exploration und Kolonisierung fremder Himmelskörper wird durch die Vorstellung eigener ausgewählter Beiträge zu den bemannten Raumfahrttechnologien akzentuierend mitgeteilt. Die Behandlung umfasst weitreichende Themen wie die Geschichte und die wesentlichen Prinzipien des Antriebs für Raketen und Raumschiffe, Anfangserfolge wie der Bau der deutschen V-2 Rakete und wie sie als Grundlage aller modernen Raketen weltweit benutzt wurde sowie Gagarins erster Raumfahrtflug eines Menschen mit Koroljows R-7 Rakete, die erste Landung auf dem Mond mit Hilfe der von Brauns Saturn-V Rakete, der Bau, Versorgung und Betrieb von Raumfahrtstationen einschließlich der ISS.

Wesentliche technologische Aspekte weltweiter Programme der bemannten Raumfahrt folgen sowie Entwicklungen im privaten Sektor, so z.B. das US-amerikanische Space Shuttle, die russische Sojus Rakete und Raumschiffe, die chinesische Langer Marsch 2F Rakete, weltweite ISS Bodenstationen, Frachtversorgungsschiffe wie die US-amerikanische Space Shuttle und Falcon 9, die russische Progress, die europäische ATV und die japanische HTV. Die Entwicklungen in den USA im Rahmen des NASA Constellation Programms werden als Beispiel für den Entwurf und Entwicklung moderner Raketen (Ares I und V) und Raumfahrzeuge (Orion) für bemannte Raumfahrt ausführlich präsentiert.

Fortschrittliche Themen und Missionen werden anhand von vorgeschlagenen Raumflügen zum Mond, Mars, Asteroiden, Librations-Punkten, neuen Antriebsformen, dem Einsatz von Robotik für bemannte Raumfahrt–Exploration und -Kolonisierung sowie der Technologie-Entwicklung und dem Bau eines Raumaufzuges besprochen. Wie die Politik den Erfolg bzw. die Stagnation der bemannten Raumfahrt beeinflusst hat wird dargestellt bevor in der logischen Darstellung der Behandlung klare Schlussfolgerungen ermittelt und zusammengefasst werden.

Schlüsselworter: Antrieb, Apollo, Ares, Asteroid, Astronaut, ATV, Bemannte Raumfahrt, Constellation, Exploration, HTV, International Space Station (ISS), Kolonisierung, Komet, Librations-Punkt, Mars, MIR, Mond, Orion, Rakete, Raumaufzug, Raumfahrtstation, Raumschiff, Robonaut, Robotik, Salyut, Saturn-V, Skylab, Sojus, Space Shuttle, Spacelab, V-2.

1Ein Teil der hier beschriebenen Arbeit wurde an der NASA Marshall Space Flight Center (MSFC) in Huntsville, Alabama, U.S.A. unter dem NASA Constellation Programm und Nachfolger durchgeführt.

Human Space Flight
– From Its Beginnings to the State of the Art –

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April 2011

Abstract

The development of human space flight is described by presenting some of the main history, principles, events, systems, and missions – past, present, and future –. The fascination of the exploration and colonization of alien celestial bodies is shared making use of some of my own chosen contributions to human space flight technologies. The treatment incorporates wide topics like the history and the most important principles about propulsion for rockets and spacecraft, initial successful developments like the construction of the German V-2 rocket and how it was used as the baseline for all modern rockets worldwide, Gagarin's first space flight of a human being using Korolyov's R-7 rocket, the first landing on the Moon using von Braun's Saturn-V rocket, the construction, supply, and operation of space stations including the ISS.

The most important technological aspects of worldwide human space flight programs follow as well as developments in the private sector, for example, the U.S. American Space Shuttle, the Russian Soyuz rocket and spacecraft, the Chinese Long March 2F rocket, worldwide ISS ground stations, cargo supply ships like the U.S. American Space Shuttle, the Russian Progress, the European ATV, and the Japanese HTV. The developments in the U.S.A. in the framework of the NASA Constellation Program are taken as an example for the design and development of modern rockets (Ares I and V) and spacecraft (Orion) for human space flight and presented in detail.

Advanced topics and missions are discussed making use of proposals for mission flights to the Moon, Mars, asteroids, libration points, new propulsion technologies, the incorporation of robotics for exploration and colonization in human space flight as well as the technology development and the construction of an space elevator. How the political environment influences the success or stagnation of human space flight is discussed before, in the logical sequence of the treatment, clear conclusions are drawn and summarized.

Keywords: Apollo, Ares, Asteroid, Astronaut, ATV, Colonization, Comet, Constellation, Exploration, HTV, Human Space Flight, International Space Station (ISS), Libration Point, Mars, MIR, Moon, Orion, Propulsion, Robonaut, Robotics, Rocket, Salyut, Saturn-V, Skylab, Soyuz, Space Elevator, Space Shuttle, Space Station, Spacecraft, Spacelab, V-2.

2Part of the work described in this paper has been carried out at the NASA Marshall Space Flight Center (MSFC) in Huntsville, Alabama, U.S.A. under the NASA Constellation Program and successor.

Author's Biosketch

Prof. Dr. V. David Sanchez A., Ph.D. is devoted to the fast and factual advancement of science, engineering, and technology. He won in 1995 as the worldwide youngest individual in history the world most prestigious engineering award, the IEEE Fellow Award with the mention "for leadership in neural and parallel computation, and pioneering contributions to autonomous space robots" ("Nobel" Prize in Engineering) and become a member of the American Association for the Advancement of Science (AAAS) in 1997.

Dr. Sanchez was civil servant of the German Aerospace Center DLR in Oberpfaffenhofen by Munich, Germany for almost a decade, where he conceived and led the development and deployment of space technology, systems, and missions with NASA, ESA, DLR flown with NASA's Spaceshuttle and ESA's Spacelab and new advanced technology programs for the German Ministry of Research and Technology. Dr. Sanchez participated in the definition of the first ESA Mars mission at ESTEC (European Space and Technology Centre) in Noordwijk, the Netherlands.

In the U.S., Dr. Sanchez won with his consortium a NASA national award to design the spacecraft family and a series of missions to the Red Planet. Dr. Sanchez co-developed at the NASA Jet Propulsion Laboratory (JPL) in Pasadena, CA the most advanced spacecraft ever built for missions to the Jupiter Moons and Pluto. Most recently, Dr. Sanchez has been working at / with the NASA Marshall Flight Space Center (MSFC) in Huntsville, AL and among others with Boeing designing and building the new U.S. spacecraft fleet generation, Ares, for crew and cargo.

In the commercial industry, Dr. Sanchez was the Chief Technology Officer (CTO) of Thuris Corp., a biotech company in Newport Beach, CA and co-led hands-on a high tech telecom and multimedia startup in Pasadena, CA within a year to a successful acquisition for $1/3 Billion by Broadcom Corp., Irvine, CA. In Europe, Dr. Sanchez built government funded winning consortia among others with Siemens AG, a half million employee company, with its Corporate Research and Development Center in Munich, Germany. Dr Sanchez had prior to joining DLR worked at Siemens AG in the Automation Division in Karlsruhe, Germany.

In the U.S. national security sector, Dr. Sanchez worked on secure, real-time computer systems at the highest level of trust at Harris in Ft. Lauderdale, FL and led hands-on in San Diego, CA as Director of Engineering an advanced classified DoD program with subcontractors including Lockheed Martin, Advanced Technology Center (ATC) and SAIC.