Mars Exploration (3)
Mars Exploration (3) (3)

Author: Dr. Frank Jansen
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany, frank.jansen@dlr.de

Dr. Benedikt Bergmann
Czech Technical University In Prague (CTU), Czech Republic, benedikt.bergmann@utef.cvut.cz
Dr. Tim Brandt
CTU in Prague, Czech Republic, tim.brandt@utef.cvut.cz
Mr. Friedrich Damme
Technical University of Berlin, Germany, friedrich.damme@tu-berlin.de
Dr. Emmanouil Detsis
European Science Foundation (ESF), France, edetsis@esf.org
Mrs. Simona Ferraris
Thales Alenia Space Italia, Italy, simona.ferraris@thalesaleniaspace.com
Prof. Ikkoh Funaki
ISAS/JAXA, Japan, funaki@isas.jaxa.jp
Dr. Oliver Funke
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany, oliver.funke@dlr.de
Mr. Jan Thimo Grundmann
DLR (German Aerospace Center), Germany, jan.grundmann@dlr.de
Dr. Lamartine Nogueira Frutuoso Guimaraes
Instituto de Estudos Avancados, Brazil, guimarae@ieav.cta.br
Mr. Martin Hillebrandt
Deutsch Luft und Raumfahrt Zentrum (DLR), Germany, martin.hillebrandt@dlr.de
Prof. Anatoliy Koroteev
Keldysh Research Center, Russian Federation, kerc@elnet.msk.ru
Dr. Jim Kuijper
The Netherlands, kuijper@nuclic.nl
Mr. Frederic Masson
Centre National d'Etudes Spatiales (CNES), France, frederic.masson@cnes.fr
Dr. Volker Maiwald
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany, volker.maiwald@dlr.de
Prof. Jürgen Oberst
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany, juergen.oberst@dlr.de
Mr. Stephane Oriol
Centre National d'Etudes Spatiales (CNES), France, Stephane.Oriol@cnes.fr
Prof. Stanislav Pospisil
Czech Technical University In Prague (CTU), Czech Republic, stanislav.pospisil@utef.cvut.cz
Mr. Martin Richter
DLR (German Aerospace Center), Germany, Martin.Richter@dlr.de
Mr. Martin Reynders
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany, m.reynders@t-online.de
Dr. Lars Schanz

DLR (German Aerospace Center), Germany, lars.schanz@dlr.de
Dr. Bernhard Schmidt-Tedd
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany, schmidt.tedd@gmail.com
Mr. Alexander Semenkin
Central Research Institute for Machine Building (JSC TSNIIMASH), Russian Federation,
a.v.semenkin@yandex.ru
Dr. Alexander Solodukhin
SSC Keldysh Research Centre, Russian Federation, solodukhin@kerc.msk.ru
Prof. Ivan Stekl
Institute of Experimental and Applied Physics, Czech Technical University in Prague, Czech Republic,
ivan.stekl@utef.cvut.cz
Mr. Tim Tinsley
United Kingdom, tpt2@nnl.co.uk
Dr. Maria Cristina Tosi
Thales Alenia Space, Italy, mariacristina.tosi@thalesaleniaspace.com
Dr. Jean-Claude Worms
European Science Foundation, France, jcworms@esf.org

HUMANS TO MARS: BY MARS- PLUS EUROPA-INPPS FLAGSHIP MISSION

Abstract

The first non-human INPPS (International Nuclear Power and Propulsion System)flagship flight with orbits Earth-Mars-Earth-Jupiter/Europa (after 2025) is the most maximal space qualification test of INPPS flagship to carry out the second INPPS flagship flight to Mars with humans (in the 2030th). This high power space transportation tug is realistic because of A) the successful finalization of the European-Russian DEMOCRITOS and MEGAHIT projects with their three concepts of space, ground and nuclear demonstrators for INPPS realization (reached in 2017), B) the successful ground based test of the Russian nuclear reactor with 1MWel plus important heat dissipation solution via droplet radiators (confirmed in2018), C) the space qualification of the Russian reactor by 2025 and D) the perfect celestial constellation for a Earth-Mars/Phobos-Earth-Jupiter/Europa trajectory between 2026 and 2035.Therefore the talk sketches the preparation status of INPPS flagship with its subsystems. Critical performance will be studied by parallel realizations of the ground and nuclear demonstrators of DEM-OCRITOS (until 2025). The space qualification of INPPS with all subsystems including the nuclear reactor in the middle of the 2020th plus the INPPS tests for about one to two years - first in high Earth orbit robotic assembly phase of INPPS and later extended in nearby Earth space environment flight -means a complete concepts driven approval for all applied INPPS space subsystem technologies.It is also important to consider wider aspects for the overall mission implementation phase. Component like the nuclear reactor as the power source for the propulsion system will have to agree with the 1992 UN principles relevant to the use of nuclear power sources (NPS) in outer space. Therefore this talk will look into the legal and policy issues of nuclear space systems related to the international realization of mission design, requirements of associated safety regulations (including AI applications in the subsystems) and new aspects for INPPS flagship commercialization and new media communication on board.