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Main Results of the ISS-40/41 Expedition Training and Activity When Executing the Mission Plan. M.V. Suraev

Abstract. The paper considers results of the ISS-40/41 expedition's activity aboard MTV "Soyuz TMA-13M" and the ISS. Also, it presents the comparative analysis and assessment of the crew's contribution to the overall program of spaceflight on the ISS. Particular attention is paid to carrying out scientific applied research and experiments aboard the station. Comments and suggestions to improve the ISS Russian Segment are given too.

Keywords: tasks of crew training, spaceflight, International Space Station, scientific applied research and experiments.

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Medical Support of the ISS-40/41 Crew Members (Express Analysis). V.V. Bogomolov, V.I. Pochuev, I.V. Alferova

Abstract. The paper shows the results of medical maintenance of the ISS-40/41 expedition and gives a brief description of operation of the system of medical support and maintaining the stability of human environment aboard the ISS RS. Besides, the paper sums up results of implementing medical recommendations, program of medical monitoring and the use of onboard means designed to prevent the alteration of cosmonauts' health status in spaceflight.

Keywords: medical support, medical monitoring, preventive system, human environment, work-rest schedule.

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Development of the Simulator Complex of Orbital Modules of the ISS Russian Segment.

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Abstract. The paper considers the configuration, structure features, and functionality of the simulator complex of orbital modules of the ISS Russian segment and the prospects for its development in accordance with the State program of the Russian Federation "Space activities of Russia in 2013-2020".

Keywords: the ISS Russian Segment, integrated and dedicated simulators for cosmonaut training, simulator complex, long-term development.

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Experience of the Use of Visual Environment Modeling Systems in Simulators of Manned Space Vehicles. A.I. Masalkin, M.A. Torgashev

Abstract. The paper discusses the historical aspects and experience in using the visual environment modeling systems in the simulators of manned space vehicles designed and operated at the Cosmonaut Training Center (Star City). Also, it examines in detail the structure of image generation systems and the progressive development of technical means for their realization beginning with the optical-mechanical simulators to computer generators that use the modern means of computer graphics. The paper gives a historical review of the developed systems and describes their performance capabilities and experience of operation. The final part of the paper describes the status of visual environment modeling systems, used presently to tackle issues of cosmonaut training as well as characteristics of visual models and capabilities of the developed software.

Keywords: visual environment modeling systems, computer image generation, simulators of manned space vehicles, cosmonaut training.

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Development of the Simulator-Based System of Modeling the Means for Visual Instrumental Observations of Earth's Surface from the ISS RS to Train Cosmonauts for Geophysical Investigations. V.S. Bartosh, M.S. Dyakov, S.A. Kuzikovskiy, V.I. Bragin

Abstract. The paper describes the development of the simulator-based system of modeling the means for visual instrumental observations of Earth's surface and also the soft/hardware complex for tackling tasks of cosmonaut training for geophysical investigations and monitoring of Earth from the board of the ISS Russian Segment. This complex was designed in 2011 by the joint-stock company "SoftLab-NSK" and is continuously being improved and used at FSBO "Gagarin R&T CTC".

Keywords: space simulators, virtual reality systems, visual and instrumental observations, computer graphics.

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Control System of the Life Support Means of the ISS's Crews. B.F. Zaretsky, G.I. Morozov, E.A. Kurmazenko, V.Yu. Proshkin

Abstract. The creation of an effective automated system to control the integrated life support system for crews in deep space missions is a complex multicriterion problem. The paper suggests the system of generalized global criteria that allows dividing the overall problem into a number of optimization subtasks and solving it. A number of specific applications are given.

Keywords: space life support systems, automated control system, global generalized criterion.

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Main Results of Testing the Properties of Special-Purpose Underwear Used in the Course of Cosmonaut Training and Space Missions. A.N. Supotnitsky, O.S. Gordienko, A.V. Kalmin, M.V. Dvornikov

Abstract. The paper considers the hygienic and ergonomic aspects of the problem of an effective use of special-purpose underwear for cosmonauts during the training process and the performance of a space mission. The current technologies of monitoring the physiological parameters of the subjects' functional state and the hygienic parameters of used underwear were applied. They have given an opportunity to carry out a comprehensive assessment, formulate the detailed requirements for cosmonauts' underwear, and develop the practical recommendations.

Keywords: moisture permeability, water-absorbing ability, dryout time, a subject, a cosmonaut, psycho-physical parameters, special-purpose underwear, thermal-physic parameters, ergonomic requirements, efficacy.

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Analysis of Limits to Applicability of the Statistical Optimization Technique for Ground Preparing a space experiment on the basis of Economic and Time Indicators. A.V. Markov, S.B. Pichugin

Abstract. The paper considers in detail the mechanisms underlying the procedure of optimizing time and financial expenditures in the course of training for performing a space experiment [1]. Upon the results of consideration the options and limits of applicability of the said technique were analyzed.

Keywords: space experiment, financial losses, failure to meet time-frame, execution with delay.

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Features of Training of Non-Professional Cosmonauts for Flights aboard the ISS.

B.I. Kryuchkov, M.M. Kharlamov, A.A. Kuritsyn

Abstract. The paper discusses a new prospective development direction of manned spaceflight industry connected with the space flights of non-professional cosmonauts, in other words with the space tourism, and also considers the organizational and methodological aspects of training the first non-professional cosmonauts (space tourists) for flight aboard manned transport vehicle.

Keywords: space tourism, non-professional cosmonauts, spaceflight participant, cosmonaut training, International Space Station, Cosmonaut Training Center.

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Experience in Designing and Operating the Computer Systems of Space Simulators. K.S.

Lunkin, Yu.A. Vinogradov, V.N. Saev

Abstract. The paper considers the issues of the becoming and development of computer systems for space simulators designed on the basis of the conception of their joint usage in accordance with which most of space simulators were created from 1972 through 2000. The analysis of the configuration and structure of computer systems and of the experience in designing and operating them taking into account

the progress in computer technology was made.

Keywords: computer systems, space simulators, analog-digital and digital computers, training system, training complex.

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Tunguska Meteorite and Cosmos in Paintings of the Artist N. Fedorov. I.A. Ryumina, N.N. Fedorova

Abstract. The bulk of creative work of a Russian painter Nikolay Fedorov is devoted to an extraordinary event, occurred in a wild Siberian area near the Tunguska River June 30, 1908. Fedorov was the only artist who took part in the scientific expedition of 1939 led by the Russian geologist Dr. Leonid Kulik. Even today, the “Tunguska Event” still puzzles the world with its unsolved mysteries. Fedorov’s paintings illustrate the fall path of the meteorite in detail, based on the eyewitness accounts and represent the whole range of scientific hypotheses concerning Tunguska meteorite.

Keywords: Tunguska meteorite, scientific ideas, artist Fedorov.

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