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WELCOME MESSAGE

Dear Participants,

Welcome to *Shanghai*! Welcome to participate in 2018 2nd International Conference on Aerospace Technology, Communications and Energy Systems (ATCES 2018). ATCES 2018 is organized by Asia Pacific Institute of Science and Engineering (APISE), all the registered and presented papers will be published in the volume of IOP Conference Series: Materials Science and Engineering (Online Publish), which will be indexed by EI Compendex, Scopus, Thomson Reuters (WoS), Inspec, and other indexing organizations.

ATCES 2018 aim to present the latest research and results of scientists related to Aerospace Technology, Communications and Energy Systems and other topics. This conference provides opportunities for the delegates to exchange new ideas face-to-face, to establish business or research relations as well as to find global partners for future collaborations. We hope that the conference results will lead to significant contributions to the knowledge in these up-to-date scientific fields.

We would like to thank our outstanding Keynote Speaker: Professor Yury A. Nozhnitskiy, professor of Central Institute of Aviation Motors (Moscow), Russia; Invited Speaker: Professor Hsiao-Kang Ma, professor of National Taiwan University, ROC.

We would like to thank all the committees for their great support on organizing the conference. We also would like to thank all the reviewers for their great effort on reviewing the papers submitted to ATCES 2018. Special thanks to all the researchers and students who with their work and participate in the conference.

We hope you enjoy the conference, the food, the hospitality, and the beautiful and charming city of Shanghai.

Prof. Yury A. Nozhnitskiy
Conference Committee Chair

CONFERENCE VENUE AND TRANSPORT INFORMATION

Jinjiang Metropolo Hotel, Shanghai 上海锦江白玉兰宾馆

No. 1251 Siping Road, Yangpu District, Shanghai

Transportation:

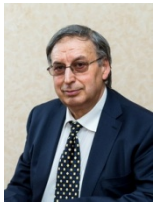
1, From Shanghai Pudong International Airport, take taxi about 45 minutes, take subway about 1.5 hours; Route: Subway line 2 east extension→ metro line 2 → subway line 10 (get off at Tongji university station (5 exit))

2. From Shanghai hongqiao international airport or Shanghai Hongqiao Railway Station, take taxi about 50 minutes, take subway about 55 minutes; Route: subway line 10(get off at Tongji university station (5 exit))

PRESENTER INDEX

INTRODUCTION TO CONFERENCE SPEAKERS

Keynote Speaker 1



Prof. Yury A. Nozhnitskiy
Central Institute of Aviation Motors (Moscow), Russia

Biography: Professor Yury graduated from Moscow aviation university in 1971 and began to work for Central Institute of Aviation Motors (CIAM)-the main Russian scientific state center for aviation engines and helicopter transmissions. From 1993 He is deputy general director and head of division " Dynamics and Strength ". Doctor of science (1997). For a long period was a general director of certification center. He worked as professor in different Russian universities. Now he is a professor of Moscow state technical university named after Bauman. An author of more than 200 publications and about 20 patents. A member of some Russian and international scientific societies and consuls including ASME, EUCASS, ESIS. He participated in different international conferences in Russia, USA, Spain, France, Italy, Belgium, Australia, Canada and other countries, main lectures or offered presentations in Russia, China, USA, Germany, Canada, etc. He is a Russian represent in ISO technical committee on gas turbine and head of corresponding Russian technical committee.

Invited Speaker 1

Prof. Hsiao-Kang Ma
National Taiwan University

Biography: Professor Ma is Professor of Mechanical Engineering and a Researcher of Research Center of Climate Change and Sustainable Development at National Taiwan University since 1987. Now he is the Board Member and Asia Liaison of Semiconductor Thermal Measurement, Modeling and Management Symposium, the Board Member of Experts Meeting on Solid Waste Management in Asia and Pacific Islands, Chairman of Taiwan Carbon Capture Storage and Utilization Association(TCCSUA), Committee Member of Environment Impact Assessment(EIA) of Taiwan EPA, and Board member of Ho-Pin Power Company. His research is directed to energy systems and the associated environmental impacts with activity ranging from combustion (boilers, furnaces, and incinerators) to advanced energy systems (Hybrid PEM fuel cell electrical car, micro-pump, and rotary engine). His current research encompasses the development and application to model combustors, combustion synthesis of SiO2/SiC/TiO2 nano-particles, micro-diaphragm pump with piezoelectric device, micro-valve,

micro-diaphragm flow channel with piezoelectric effect in PEMFCs/SOFCs, e-waste recycling/recovery, and energy/environment policy. Research by Professor Ma has been documented in over 250 publications. He is also a specialist on the combustion/heat transfer/energy/environment areas in Taiwan. He was the Board Member of the Steering Committee International Electronics Recycling Congress in Switzerland in 2008-2017. He was the Board Member of Taiwan Power Company in Taiwan in 2009-2017. He was Chairman of Chinese Boiler Association in Taiwan in 2008-2010, President of Chinese Taipei Section of the Combustion Institute in 2008-2010, CEO of Institute of Environment and Resources (Taiwan) in 1998-2000, board member of TMMC, CTCI in 1990s and was chairman of Foundation for Obsolete appliance Recycling and Management (Taiwan) in 1997-98. And, he was Research Engineer of Energy and Environmental Research Co. (Irvine, USA) in 1985-87. He received the Ph.D. degree in Mechanical Engineering from the University of Illinois, USA.

INSTRUCTIONS TO PRESENTATIONS

Devices Provided by the Conference Organizer:

Laptops (with MS-Office & Adobe Reader)
Projectors & Screen
Laser Sticks
Tape

Materials Provided by the Presenters:

Oral Presenter:
PowerPoint or PDF files
Duration of each Presentation (Tentatively)

Poster Presenter:
Poster: 0.8m*1m; color printing; Add Conference Name's Acronym and Paper ID on the top of poster (Such as "ATCES 2018" A001)

Minutes of Q&A

Keynote Speech: 40 Minutes of Presentation
Invited Speech: 30 Minutes of Presentation
Presenter: 15-20 Minutes of Presentation

NOTICE:

- Certificate of Participation will be awarded by Session Chair after each presentation finished.
- The organizer will not provide accommodation, so we suggest you make an early reservation.
- One best presentation will be selected from each session. The best one will be announced when each session ends, and will be awarded by the session chair after each session in the meeting room.
- The attendee should provide the Confirmation Letter of Attendance when register.

ATCES 2018 CONFERENCE PROGRAM OVERVIEW

Sept.15		**Registration**								
		14:00 - 17:00								
		Registration and Conference kits collection **Hotel Lobby**								
Sept.16	**Opening Ceremony**	**Keynote Speech and Group Photo**			**Presentation session**	**Lunch**	**Presentation session**			**Dinner**
	9:00-9:10	9:10-9:50	9:50-10:20	10:20-10:50	10:50-12:20	12:20-14:00	14:00-16:00	16:00-16:20	16:20-18:00	18:00-19:00
		Yury A. Nozhnitskiy	Hsiao Kang Ma	Coffee break, group photo and poster session	Presentation Session **I**	CHINESE RESTAURANT	Presentation Session **II**	Coffee Break and poster session	Presentation Session **III**	CHINESE RESTAURANT
	Opening Ceremony & Keynote Speech Session & Session I (GUOJI MULTI-FUNCTIONAL HALL 15th floor)					First floor	Session II &III (GUOJI MULTI-FUNCTIONAL HALL 15th floor)			First floor
Sept.17		Technical Tour								

SESSION OVERVIEW

Session I **Sept. 16, 2018** **10:50-12:20** GUOJI MULTI-FUNCTIONAL HALL	**A016** Zhou Huan-Ding	The Analysis of Compound Control in the Pre-launch Attitude of Internally Carried Air-launched Rocket Based on Simulink
	A030 HEMZA LAYACHI	Design, modeling and performance optimization for propulsion of a small launch vehicle
	A034 Alexander Kusyumov	Numerical Simulation of Aeroacoustics of Hovering Helicopter Rotor
	A041 Tingting Du	Design of universal PCIe interface module based on vs
	A045 Binglong Zhang	Research on Influence of Geometric Adjustment on Performance of Variable Cycle Engine
	A1003 Zheng Zhang	A PSK signal symbol rate estimation algorithm based on the combination of stochastic resonance and wavelet transformation
Session II **Sept. 16, 2018** **14:00-16:00** GUOJI MULTI-FUNCTIONAL HALL	**A1012** MD MAHBUBUR RAHMAN	Radio Frequency Excited Plasma Discharge Simulation for Potential Helicon Plasma Thruster
	A023 Anatolii Kretov	Engineering method of obtaining stiffness criterion for heated thin-walled structures
	A026 ABDUL HAKIM MUZAKKI	The effects of tailplane ice accretion on flight stability of commuter category aircraft for high terrain remote areas flight operation
	A028 NABIL ADITYA RAMADHAN	Determining the horizontal tail optimum dimension of civil transport class aircraft based on the previous model for upgrading the passengers number
	A029 LUKY LUXASA SUNARA	An estimation of the maximum take-off weight commuter category aircraft based on airstrip condition on remote high terrain area
	A031 DERIZAR IHSAN PRATAMA	Landing performance prediction of commuter aircraft due to wings ice accretion on high terrain operation
	A040 Bing Bai	Numerical study of the effects of fluid conductance and the capacity of negatively

		pressured cabin to the process of explosive decompression
	A1001 Chen Yinghua	Experimental Research on the Helicopter Sliding Stability after Ditching
Session III **Sept. 16, 2018** **16:20-18:00** GUOJI MULTI-FUNCTIONAL HALL	**A015** Wang Kaiqiang	Influence of the earth rotation on trajectory of a returnable hypersonic cruise vehicle
	A025 Gaoyue Wang	Efficient Evaluation of Mars Entry Terminal State Based on Gaussian Process Regression
	A039 Xian Zhang	Rapid decompression technology for the oxygen supply system
	A042 Lingjian Xu	A Rapid Estimation for Interplanetary Low-Thrust Trajectories Using Support Vector Regression
	A043 Kuoxiang Zhang	Evaluating Gravity-Assist Range Set Based on Supervised Machine Learning
	A047 Ding Wenjing	The method of field simulation for ultra-cryogenic environment on lunar
	A012 Harshit Jain	ANUPADIN 1.0

FULL SCHEDULE

Registration **Sept. 15, 2018 Saturday** **14:00 -17:00** **Hotel Lobby**	
14:00-17:00	Participants Registration and Conference kits Collection

Keynote Speech & Invited Speech **Sept 16, 2018 Sunday** **9:00-10:20** **GUOJI MULTI-FUNCTIONAL HALL**	
9:00 - 9:10	**Opening Remark**
9:10 - 9:50 **Keynote Speaker 1**  Prof. Yury A. Nozhnitskiy Central Institute of Aviation Motors (Moscow), Russia	**Title of Speech:** Prevention of hazardous failure of the turbine rotor due to its overspeed **Abstract:** Causes of defects that can lead to the turbine rotor overspeed and subsequent hazardous consequences are considered. Methods of preventing unacceptable overspeed and confirmation of the sufficient strength of the turbine rotor are analyzed. Particular attention is paid to the developed method of calculating burst speed of the rotor. A comparison of the numerical and experimental data on basis of relation between radial displacements during spin tests, burst speed, high-speed image acquisition, fracture origin and fracture confirms possibility to use the developed method of calculations. The presented method allows to adjust the value of a disc rotation rate during certification spin tests to ensure that a disc with the worst mechanical properties will not burst in operation and to take into account differences in the design and loading conditions between the disc for spin tests and disc for operation. If the identification of model's material parameters was

	performed based on disc's tensile tests and spin tests, then for a disc of another design from the same material only calculations can be used.
9:50 - 10:20 **Invited Speaker 1**  Prof. Hsiao-Kang National Taiwan University	**Title of Speech:** Theoretical Study of A Three-Swing Blades Rotary Engine **Abstract:** The innovative rotary engine with three swing blades has been developed and divided into a compression section, a combustion chamber, and a power section. With the three swing blades on each rotor, the swing blade comprises a cylindrical roller mounted to a front end and a curved back, and each of the roller is provided, at an inner side, with a support device that is capable of sustaining a counteracting force applied by a cylinder wall to the roller. When the rotary valve of the power unit is combined with the rotor and the air outlet port of the combustion chamber is connected with the opening of the rotary valve of the power unit, the motion of the swing blade is "arc" opening and cutting along the cylinder wall movement with the tip of the blade. In this study, the theoretical model has been established to calculate the trajectory/the tip speed of the swing blade, pressure variation, compression torque and to predict the performance of the rotary engine. For a prototype 120 cc rotary engine, it can provide an estimated power output between 6.26 to 50.16-hp at about 1000 to 8000 rpm
10:20 -10:50	**Group Photo and Coffee Break**

Session I

Sept. 16, 2018 Sunday

10:50 -12:20

Session Chair: Wahyu Nirbito

GUOJI MULTI-FUNCTIONAL HALL

A016	**Presenter:** Zhou Huan-Ding Space Engineering University, China **Title:** The Analysis of Compound Control in the Pre-launch Attitude of Internally Carried Air-launched Rocket Based on Simulink **Authors:** Zhou Huan-Ding, Xie Wei-Qi and Cai Yuan-Wen **Abstract:** Prelaunch attitude control not only plays a significant role in the launching process of internally carried air-launched rocket, but also has an important influence on engine ignition and orbit injection accuracy. On the basis of full understanding of the attitude control methods of air launched rockets at home and abroad, also combined with the specific control requirements of pre-launch attitude control, A new control method using grid rudder and RCS and combined of aerodynamic force and direct force is proposed.The simulation of the compound control scheme is carried out by using Simulink. The control characteristics of the scheme are analyzed, and the feasibility of the scheme is verified.
A030	**Presenter:** HEMZA LAYACHI Algerian Space Agency, ALGERIA **Title:** Design, modeling and performance optimization for propulsion of a small launch vehicle **Authors:** Layachi Hemza, Boudjemai Abdelmajid and Houhou Hatem **Abstract:** In this study, we will establish a platform for design modeling and performance analysis for a propulsion module of a small launch vehicle. After giving it the suitable mathematical reformulation, we will use MATLAB-SIMULINK as a numerical tool for calculating the specification for the needed factors. The validation of each parameter has to be sequential to reach the optimized model, our simulation basics are established on tracking and a regulation methodology, after defining the design variables, giving the mathematical formulation, the simulation procedure set up on the interaction of the designated parameters to reach the suitable scenario. The integration of a regulation tool was in aim to set the output of each sub-system and avoid possible dysfunction in the whole system.
A034	**Presenter:** Alexander Kusyumov KNRTU-KAI, Russia

	Title: Numerical Simulation of Aeroacoustics of Hovering Helicopter Rotor **Authors:** A N Kusyumov, S A Mikhailov, S A Kusyumov, K V Fayzullin and G N Barakos **Abstract:** The specifics of the problem of estimating the noise of a hovering rotor, allows for some simplification of the Ffowcs Williams-Hawkins (FW-H) equation. Most published works dedicated to helicopter tonal noise estimates use the far-field formulation. This paper estimates the aeroacoustic emissions of a helicopter rotor in hover, for observers placed at different distances using the FW-H equation, including near-field and far-field terms. The blade pressure distribution is obtained from numerical simulations with the RANS equations. To demonstrate this approach, the near- and far-field contributions are analyzed for the model-scale UH-1H main helicopter rotor. For the numerical simulations, the HMB solver of Glasgow University and the ANSYS Fluent13 commercial solver are used. As the rotor blade behaviour is characterized by a complex motion in the computer program it is assumed that the blade is seen in as a rotating rigid body. The most commonly used mathematical model of the FW-H equation corresponds to the classical impermeable formulation. In this case, the source surface corresponds to the blade surface. Then, the acoustic pressure (based on the FW-H 1A formulation) is modified with empirical adjustments, based on the radiation Mach number. This was applied for the near- or far-field thickness noise depending on the rotor-observer distance.
A041	 **Presenter:** Tingting Du Beijing Institute of Technology, BIT, Beijing, China **Title:** Design of universal PCIe interface module based on vs **Authors:** Tingting Du and Qingzhong Jia **Abstract:** Due to wide variety of interfaces and complex bus protocols, the general detection system has problems such as high bus usage threshold and poor portability of the host computer software, which greatly reduces the user's development efficiency of the detection system. In response to the issue, this paper designs a universal interface module for PCIe based on vs. The module provides unified functional

	interfaces, through which the data transmission of all bus devices can be easily and reliably controlled. In this paper, the design idea of the universal interface module is explained. Finally, the module is illustrated and the result shows that the designed scheme is feasible.
A045	 **Presenter:** Binglong Zhang Beijing Institute of Spacecraft Environment Engineering, China **Title:** Research on Influence of Geometric Adjustment on Performance of Variable Cycle Engine **Authors:** Binglong Zhang, Shuiming Liu and He Liu **Abstract**: Based on conventional turbofan engine, this paper adding mode selection valve, the front variable area bypass injectors and the rear variable area bypass injectors to build a mathematical model of the variable cycle engine. Then the influence of adjustable components on engine performance is simulated by computation program. The simulation results show that in the same work mode, the front variable area bypass injectors and the rear variable area bypass injectors have the same effect on engine performance, but different from the mode selection valve; Both front variable area bypass injectors and rear variable area bypass injectors have different effects on engine performance in different modes.
A1003	 **Presenter:** Zheng Zhang Information Engineering University, China **Title:** A PSK signal symbol rate estimation algorithm based on the combination of stochastic resonance and wavelet transformation **Authors:** Zheng Zhang, Jinquan Ma and Xuecheng Wan **Abstract:** In non-cooperative communications, the deterioration of the channel makes the SNR of the received PSK signals at a low level, resulting in the failure to estimate the symbol rate. Stochastic resonance can use noise energy to strengthen the weak signals, and wavelet transform can effectively detect the transient phase. This paper proposes to use stochastic resonance combined with wavelet transform to estimate the symbol rate of

	the PSK signals. It not only overcomes the drawback that stochastic resonance disperses easily as a nonlinear system, but also reduces the influence of the optimal size of the wavelet. The simulation results show that this method can improve the output peak to a certain extent and reduce the threshold of SNR, which is of great significance for the symbol rate estimation for weak signals.
12:20 -14:00	**Lunch** 

Session II **Sept. 16, 2018 Sunday** **14:00 -16:00** **Session Chair: Alexander Kusyumov** **GUOJI MULTI-FUNCTIONAL HALL**	
A1012	 **Presenter:** MD MAHBUBUR RAHMAN SKOLKOVO INSTITUTE OF SCIENCE AND TECHNOLOGY, Russia **Title:** Radio Frequency Excited Plasma Discharge Simulation for Potential Helicon Plasma Thruster **Authors**: Md Mahbubur Rahman and Ighor Uzhinsky **Abstract:** The development of advanced propulsion is the key element in the implementation of a robust space exploration program. Advance thruster concepts such as the development of electrodeless Plasma thrusters with high-density helicon plasma sources expected to mitigate the existing problems of the finite lifetimes inherent in electric propulsion. Electrodeless plasma thrusters are potentially more durable than conventional thrusters that use electrodes such as a gridded ion, Hall thrusters, arcjets, and resistojets. The goal of the research is to simulate a compact high-power-density helicon plasma source operating, which is under examination for a potential electric propulsion application. Plasma modeling is performed in

	COMSOL Multiphysics plasma module. A Nagoya type III antenna is placed on the surround of a dielectric tube and electrically excited at 13.56 MHz. Plasma is formed in the ionization chamber, which contains argon gas at low pressure. The plasma is sustained utilizing electromagnetic induction.
A023	**Presenter:** Anatolii Kretov Nanjing University of Aeronautics and Astronautics, China **Title:** Engineering method of obtaining stiffness criterion for heated thin-walled structures **Authors:** Kaixin Zhuang, Shataev P.A. and Kretov A.S **Abstract:** Rigidity of flight vehicle is one of the important indexes, it must be ensured at all stages of its life cycle. Usually, rigidity is calculated and adjusted at the design stage, when the structure of the elastic system is formed under the strength conditions. In this paper, the problem of obtaining the most rigid of thin-walled unevenly heated structure with a given volume of material and with a given load-carrying scheme is studied, and possible deformations of plasticity and creep , which often accompany with high temperatures, also are considered. In order to solve this problem, the structures characteristic–uniform distribution of the specific potential deformations energy is analysed, the criterion for the maximum structure rigidity is formed by using energy method, and for typical thin-walled heated structures with heterogeneous materials and initial deformations, a iterative formula for getting optimal structural parameter is obtained. By a numerical example the method was verified.
A026	 **Presenter:** ABDUL HAKIM MUZAKKI Universitas Indonesia, Indonesia **Title:** The effects of tailplane ice accretion on flight stability of commuter category aircraft for high terrain remote areas flight operation **Authors**: A B Hakim, W Nirbito and M Adhitya **Abstract**: The effect of ice accretion on the surface of the horizontal tail on aerodynamic characteristics and stability of commuter category aircraft is reviewed using predicted ice shapes and polar predictions using CFD software. Ice accretion

	prediction is carried out in various atmospheric conditions already listed in Appendix C FAR25 within remote high terrain flight operation condition. The predicted results of ice shapes are categorized according to the main shapes which will then be simulated using XFOIL. The resulting polar data then combined with data obtained from wind tunnel test to give lift coefficient predictions and the overall moment of the aircraft at zero flap condition. The most severe impact of ice accretion on the surface of the horizontal tail is found in the decreasing values of stalling angle of attack and maximum lift coefficient due to flow separation, with stalling angle of attack and maximum lift coefficient as low as 9.54 degrees and 0.765. The most visible decrease in static longitudinal stability and the static margin point are 6.88% and 6.34% from the normal condition.
A028	 **Presenter:** NABIL ADITYA RAMADHAN Department of Mechanical engineering, Faculty of engineering, Universitas Indonesia, Indonesia **Title:** Determining the horizontal tail optimum dimension of civil transport class aircraft based on the previous model for upgrading the passengers number **Authors**: N Aditya and W Nirbito **Abstract:** As is well known, the horizontal tail of the plane has a function to produce a force to provide stability in the longitudinal spell of the plane. The determination of the contribution of the horizontal tail to longitudinal stability on the plane can be determined by simple methods such as using Digital DATCOM software. The simulations predicted by this method can save both time and cost. Nevertheless, the determination of the horizontal tail volume ratio can still be taken into further calculation so that the horizontal tail of the aircraft to work optimally. Using the analytic calculation of the aircraft equation of motion, the value of the horizontal tail volume ratio on the plane can be determined. The value of this horizontal tail volume ratio can be used as a reference to modify the area of the horizontal tail dimension of the aircraft. The calculation results show that the area of the horizontal tail of the aircraft can be reduced to 13.16 m2 and the dimensions for the new horizontal tail shape can be determined by considering the aspect ratio and taper ratio of the reference design.

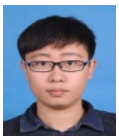
A029	 **Presenter:** LUKY LUXASA SUNARA Department of Mechanical engineering, Faculty of engineering, Universitas Indonesia, Indonesia **Title:** An estimation of the maximum take-off weight commuter category aircraft based on airstrip condition on remote high terrain area **Authors:** L L Sunara and W Nirbito **Abstract:** The conditions of the runway on remote high terrain area with mountain conditions are the problem for the aircraft. The short of runway length and the higher location can affect to the take-off performance of the aircraft. Thus the determination of the maximum take-off weight is critical in order for the aircraft to take-off safely. The purpose of this research is to determine the maximum take-off weight for 19 passengers commuter category and double engine propeller driven aircraft based on runway condition at ISA +20 on remote high terrain area. The intended of runway conditions are the altitude of the runway location, the slope of the runway, the surface condition of the runway and the wind speed around the runway. The take-off distance approach based on aerodynamic characteristics, geometry, and power plant is described. The results obtained that the aircraft can take off at remote high terrain area with an altitude above 5000 feet and runway length of 393 m to 600 m for all engine operative conditions.
A031	 **Presenter:** DERIZAR IHSAN PRATAMA Department of Mechanical engineering, Faculty of engineering, Universitas Indonesia, Indonesia **Title:** Landing performance prediction of commuter aircraft due to wings ice accretion on high terrain operation **Authors:** D I Pratama, W Nirbito and M Adhitya **Abstract:** Ice accretion on a wing is one of the aviation accident factors because it will interrupt the flow over an airfoil that will reduce its performance. The effect of wings leading edge ice

	accretion on the landing distance of commuter class aircraft in remote high terrain operation was obtained with the help of LEWICE code for ice shape predictions and XFLR5 for airfoil polar data prediction. The ice accretion process occurred within various icing atmospheric conditions based on Icing Design Envelopes 14 CFR part 25.1419, Appendix C. Two category of ice accretion, horn ice and streamwise ice, were obtained on the leading edge of the wing. The performance degradation caused by the ice accretion will increase aircraft landing speed that it will affect the landing distance.
A040	 **Presenter:** Bing Bai Beijing Institute of Spacecraft Environment Engineering, China **Title:** Numerical study of the effects of fluid conductance and the capacity of negatively pressured cabin to the process of explosive decompression **Authors:** Bing Bai, Junwei Wang and Ying Zhou **Abstract**: Explosive decompression is the rapid decompression process of aircraft in the sky caused by the damage of cabin which challenges the safety of people and equipment. The explosive decompression tester usually uses negative pressure reserve cabin technology. Numerical study was conducted to analyse the influence of the throttling and negative pressure reserve cabin volume on the explosive decompression process. The results show that as the throttle opening, the explosive decompression time decreases and the fluctuation amplitude of the two chambers after the pressure balance is enhanced; the volume of the negative pressure reserve cabin has little effects on the rate of explosive decompression and has no obvious influence on the fluctuation.
A1001	 **Presenter:** Chen Yinghua The China Helicopter of Research and Development Institute, China **Title:** Experimental Research on the Helicopter Sliding Stability

	after Ditching **Authors:** Chen Yinghua, Wu Ximing, Yuan Libin **Abstract:** As the application of the helicopter increases rapidly, more and more attention is paid to the safety. Thus the survivability and crashworthiness has been an important assessment items for the helicopter design and flight certification. In this paper, a newly designed ditching experiment with a helicopter model scaled 1:8 was conducted to attain the dynamic response of loads and especially the posture. Parameters such as weight, bladder pressure, lateral wind and ditching velocity were set in different groups to investigate the effect on the sliding stability. Based on the result, comparison and analysis was carried out and some conclusions were given. Meanwhile, the method and process of the experiment was presented in detail and proved an effective and available reference for the helicopter flight certification.
16:00-16:20	**Coffee Break** 
Session III **Sept. 16, 2018 Sunday** **16:20 -18:00** **Session Chair: Hsiao Kang Ma** **GUOJI MULTI-FUNCTIONAL HALL**	
A015	 **Presenter:** Wang Kaiqiang China Academy of Space Technology, China **Title:** Influence of the earth rotation on trajectory of a returnable hypersonic cruise vehicle Performance Evaluation of Sentiment Classification **Authors:** Kaiqiang Wang, Yanze Hou and Chong Chen **Abstract**: It is of high difficulty for a hypersonic vehicle to implement a hypersonic cruise flight and return to a scheduled airport without power. Accuracy of mission simulation and

	analysis is more crucial at this time. Under this circumstance, it is meaningful to discuss whether the earth rotation should be considered in the dynamic model and trajectory design. In this research, the dynamic equations in which the earth rotation is taken into consideration are derived for a hypersonic cruise vehicle. The direct shooting method is utilized for parameterization and discretization of the trajectory, so that the trajectory can be analyzed and simulated through numerical integration. Then, two groups of trajectory simulation results are presented. In each group, the only difference between the two trajectories is that whether the earth rotation is involved, and the two trajectories are compared with each other. For a returnable hypersonic cruise vehicle which returns to the ground without power, whether to involve the earth rotation in the dynamic model is discussed on the basis of the numerical results, and relevant suggestions are given for reference.
A025	 **Presenter:** Gaoyue Wang Beijing Institute of Technology, China **Title:** Efficient Evaluation of Mars Entry Terminal State Based on Gaussian Process Regression **Authors:** A Gao, G Y Wang, S S Wu and T Song **Abstract**: Trajectory optimization technology used for Mars entry is one of the key technologies for planetary exploration. Evaluation of the performance of the entry trajectory under conditions of complex atmospheric dynamics, various vehicular design parameters, and multiple constraints in the process of entry, are important issues pertaining to the design of trajectories. In this study, an efficient evaluation approach of the terminal state for Mars entry is proposed based on Gaussian process regression to evaluate the maximum terminal altitude for different entry velocities, terminal Mach numbers, and vehicular parameters. Additionally, the influences of entry flight-path angle, lift-drag ratio, and ballistic coefficient, on the maximum terminal altitude are analyzed. A genetic algorithm is used in the optimization solver to avoid local minima and to guarantee the data quality of the training samples used for Gaussian process regression. The mean function, kernel function, and hyperparameters are selected as the optimization parameters for Gaussian process regression to describe the correlation between samples, and the maximum terminal

	altitude prediction model is then established. Numerical simulations demonstrate that the proposed method can achieve the evaluation of more than 3000 group scenarios within tens of seconds with a mean relative error that is less than 4%.
A039	 **Presenter:** Xian Zhang Beijing Institute of Spacecraft Environment Engineering, China **Title:** A PSK signal symbol rate estimation algorithm based on the combination of stochastic resonance and wavelet transformation **Authors:** Xian Zhang, Wei Leng, Ying Zhou, Ran Liu and Junwei Wang **Abstract:** In non-cooperative communications, the deterioration of the channel makes the SNR of the received PSK signals at a low level, resulting in the failure to estimate the symbol rate. Stochastic resonance can use noise energy to strengthen the weak signals, and wavelet transform can effectively detect the transient phase. This paper proposes to use stochastic resonance combined with wavelet transform to estimate the symbol rate of the PSK signals. It not only overcomes the drawback that stochastic resonance disperses easily as a nonlinear system, but also reduces the influence of the optimal size of the wavelet. The simulation results show that this method can improve the output peak to a certain extent and reduce the threshold of SNR, which is of great significance for the symbol rate estimation for weak signals.
A042	 **Presenter:** Lingjian Xu Beijing Institute of Technology, China **Title:** A Rapid Estimation for Interplanetary Low-Thrust Trajectories Using Support Vector Regression **Authors:** L Xu, H Shang and X Qin **Abstract**: During the preliminary phase of space mission planning and design, a large quantity of trajectory optimization problems have to be solved. Obtaining the optimal solutions of low-thrust trajectory is computationally challenging since the optimization problems usually involve an iterative numerical

	algorithm and the complicated numerical integration of the equations of motion. It is necessary to develop the rapid trajectory estimation methods for low-thrust transfer. In this paper, a new method based on machine learning has been proposed to estimate the optimal interplanetary low-thrust trajectory. The minimum-propellant low-thrust trajectory is optimized by using the hybrid optimization algorithm, which would provide the high-quality training samples for machine learning. Support vector regression is adopted to construct and train the estimation model. Numerical simulations demonstrate that the proposed estimation method and the percentage errors of random test samples are all lower than 5%. This application of machine learning method can accomplish very efficient low-thrust interplanetary trajectory evaluation and it is therefore suitable to extend the design flexibility in the practical exploration mission.
A043	 **Presenter:** Kuoxiang Zhang Beijing Institute of Technology, China **Title:** Evaluating Gravity-Assist Range Set Based on Supervised Machine Learning **Authors:** K Zhang, H Shang, Q Chen and X Qin **Abstract**: The dynamics of gravity-assist (GA) trajectories contain strong nonlinearity, which makes the traditional methods for impulse transfer range set (RS) are intractable to deal with the gravity-assist RS. This paper develops a novel method to evaluate the gravity-assist RS based on regression methods in supervised machine learning (SML) field. The performances of three powerful regression methods with several common kernel functions are assessed. The Gaussian Processes Regression (GPR) method with Matérn 3/2 kernel is selected because of the minimum mean squared error (1.11×10-3 km2/s2). The predicting model based on GPR is constructed to make prediction form the orbital elements of destination orbits to the total velocity increment of corresponding optimal GA trajectories. The percentage error of predicting model is no more than 2%. Millions pairs of sample points are generated by the trained predicting model. The points with specified value of total velocity increment are extracted, of

	which the envelope constitutes the gravity-assist RS. Both of Venus GA and Mars GA trajectories are considered in this paper.
A047	 **Presenter:** Ding Wenjing Beijing Institute of Spacecraft Environment Engineering, China **Title:** The method of field simulation for ultra-cryogenic environment on lunar **Authors:** Ding Wenjing, Shan Weiwei and Xu Jinghao **Abstract:** Based on the requirement of ultra-cryogenic test for lunar roving vehicle and its component, theoretical analysis was performed in this paper. Gaseous helium cold box was designed and numerical simulation was conducted to optimize the design of cold box. After manufacturing, it was put into use and finished the task successfully. The Test performance of cold box shows that temperature uniformity of the cold box's during the test meets the requirement. The temperature of the cold box can be cooled down to 30K±1K, and the lowest temperature of test specimen is down to -205℃.
A012	 **Presenter:** Harshit Jain Visveswaraya Technological University, India **Title:** Anupadin 1.0 **Authors:** Harshit Jain, Arun Kumar, Omkar Lawate and Bhavish S **Abstract**: The Unmanned Aerial Vehicle is commonly an Aircraft of feasible sizes with its pilot or controller aboard. Over the years we have seen the usage of UAVs in various multicultural activities that include:- 1. Military & Defense 2. Conservation 3. Irrigation 4. Mapping 5. Patrolling, etc. In this System, we Introduce and propose a new application for the use of drones in the field of Search and Rescue of human

	body insights of regions affected by Natural and Manmade Calamities and is stuck under debris, where it is impossible for human being to conduct a wide scale search mission. This system uses eight highly efficient and lightweight UAVs that is directed towards eight different geographical axes. Each drone initially detects the zones with high possibilities of human existence and then the drones' uses SWARMING techniques and gives the data about the possibility of human existence in and around the particular geographical positions. This in return increases the drone traffic in that particular geographical positioning leading to a better effective search in the most affected zones. The drone carries a location tracker, a Ground Penetrating Radar, Pixhawk and a specially assembled system that generates Microwave Radiations. This uses a technique of detection of a human body through the generation of Microwave Radiations. This Microwave system operates at a frequency of 1150 MHz and 450 MHz and can easily detect the human being through the heartbeat and the breathing even if the subject is trapped in between a 10 ft. deep construction rumble.
18:00-19:00	**Dinner** 

Sept 17. 2018	**Technical Tour**

POSTER PRESENTATION

10:20 - 10:50 & 16:00 – 16:20

A001	**Title: An Un-differenced Carrier Phase Time Transfer Method Between Stations** **Authors:** WANG Xiang-lei, SHI Feng and DU Yan **Abstract:** An un-differenced carrier phase time transfer method between stations is proposed. Using the relations between un-differenced observation equations which established through common view satellites, the results of the satellite clock offset and inter-station time transfer can be calculated jointly. It is not limited by the accuracy and real-time performance of the satellite clock. Experimental results show that the time transfer accuracy of the proposed algorithm can reach sub-nanosecond magnitude, and it can be applied to high precision real-time time transfer.
A006	**Title: Imitators of Dynamic Systems with Landing** **Authors:** Danilov Alexander and Garkina Irina **Abstract:** The dependencies of the simulation characteristics of simulators (for the preparation of the operators of transport ergatic systems) on the step of integrating the equations of motion of the Runge -Kutta control object of the second order of accuracy (updating the initial conditions at each integration step) are analyzed. Clarification of the time-dependent parameters of the control object (aerodynamic coefficients, mass, etc.) is made at each step. Approximate methods for estimating the effect of delay in subsystems (the latent period of the operator's motility, the play in the control channels, etc.) are given. An analytical evaluation is made of the dependence of the required integration step on the parameters of the control object. The admissible values of the integration steps are given for various criteria for estimating the integration accuracy. The methods underwent practical approbation when setting up a number of simulators of the dynamics of objects of ergatic systems.
A007	**Title: A design of space-borne AIS scene simulation based on density distribution of global vessels** **Authors:** CHEN Lihu, Liu Xianfeng, Yu Sunquan and LI Shiyou **Abstract:** At present, the demand for application of space-borne Automatic Identification System (AIS) is increasing. Since more and more satellites are equipped with AIS payload, it is especially important to test the effectiveness of its performance. Owing to difficult test on AIS payload and high cost, this paper proposes a method of space-borne AIS scene

	simulation platform based on density distribution of global vessels, focusing on basic principle and design method of simulation scene. It contains detection range computing, the number of vessels within range and the detection probability of AIS receiver. Moreover, corresponding software and hardware have been designed. 'Ocean-2B' satellite-based AIS payload is used to test the performance of the scene simulation system, which indicates that the method can simulate real scene of receiving signals in orbit in a favourable manner. Keywords: Space-borne AIS; Density distribution; Scene simulation
A014	**Title: Short Term Load Forecasting by Adaptive Neural Network** **Authors:** Hong Li **Abstract:** The Generation and load balance is required in economic scheduling of the generating units and in electricity market trades. Energy forecasting became very important to mitigate some of the challenges that arise from the uncertainty in the resource. The paper presents a short-term forecasting of hourly electric power load. Historical data are sourced from Global Energy Forecasting Competition 2017 (GEFCom2017). An adaptive learning algorithm is derived from analysis of system stability to ensure convergence of training process. The simulations with different initial state of network structure demonstrate that training error steadily decrease with an adaptive learning factor starting at different initial values whereas errors behave volatile with constant learning factors.
A017	**Title: Research Progress of Key Technologies for Typical Reusable Launcher Vehicles** **Authors:** Zhong Ya, Liu Danghui and Wang Chen **Abstract:** In recent years, driven by space X and other commercial companies, reusable launch vehicle technology has made great progress. The development of reusable launch vehicle has become an important direction of space development in the future. First, the development status of reusable vehicles, the Space Shuttle Mode, the Falcon-9 Mode, the Launch Mode on board, and the Airborne Aircraft Mode, are introduced. Second, the structure design, the propulsion system, the recycling scheme, the thermal protection system and the launch costs is analyzed. Third, related development suggestions are put forward in terms of the carrier configuration, the recycling scheme, the propulsion system and the thermal protection system..
A022	**Title: Simultaneous transmission and reception transponder for nano-satellite** **Authors:** Yuan Fu

	Abstract: The feasibility of simultaneous transmission and reception (STAR) in the same frequency for space transponder in nano-satellite is discussed. The demand of the self-interference cancellation for the transponder is also analyzed, and a STAR superheterodyne architecture for the transponder is presented. Based on the conventional TT&C frequency scheme, a feasible frequency scheme and digital signal processing process for the STAR transponder are also expatiated. The implementation of the STAR transponder is simulated. The simulation results show that with properly deploying the passive and active self-interference cancellation modules, the self-interference can be cancelled to meet with the demand of demodulation which also implies that the STAR transponder presented in this paper is feasible.
A032	**Title: Fault tolerant three level ANPC inverter circuit with finite set model predictive control** **Authors:** Li Xue-feng， Lei Xiao-ben，Han Jan-ding， Wang Chuan-qi and Zeng Jia-qi **Abstract:** An improved active neutral point clamped (ANPC) inverter circuit topology is proposed. Through the fault-tolerant leg ,the fault-tolerant performance of the inverter circuit has been greatly improved. The fault-tolerant leg works as an actuating device which control the neutral point to remain stable, when there is no fault with the inverter. When some power tubes are broken the leg works as the redundant device to replace the power tubes. The finite set model predictive control method is used for this inverter circuit. This control method is quite suitable for the electronic circuit .This method is employed to lower THD and to advance its dynamic, so that the error tolerance and high power output of the aviation inverter are satisfied. The feasibility and effectiveness are proved by simulations.
A033	**Title: Small Fault Detection for Satellite Attitude Control System Actuators with Stacked Autoencoder Network** **Authors:** L Li, Y M Gao, Z H Wu, X B Zhang **Abstract:** The fault detection method based on the analytical model can not completely deal with the model uncertainty, disturbance torque, measurement error and other disturbances, and it is difficult to detect small faults similar to disturbances. A detection method of small actuator fault based on stacked autoencoder(SAE) network is proposed. By learning historical data of system, SAE network can reconstruct the state data with stable errors. The relation between states of system will change when a fault occurs, and residual will change too. The variation trend of the residual can be used to detect the fault. Simulation results show that SAE network is more robust to disturbance compared with Elman neural

	network and nonlinear observer. Small faults under the disturbance can be detected by SAE network.
A044	**Title: Investigations on a three-dimensional model of the moving-coil linear motor applied in the space-borne micro compressor** **Authors:** Y B Zhao, D Ding and X C Mao **Abstract:** In order to optimize the magnetic circuits of the linear motor applied in the space-borne pulse tube cryocooler, a three-dimensional magnetostatic field model of the moving-coil linear motor in the micro compressor is established. The effects of several key dimensions on the distributions of the magnetic flux density inside the air gap are simulated and discussed by finite element method. The simulated results show that the magnetic flux density decreases with the increase of both width and thickness of air gap. According to the analysis, it will greatly facilitate the design, fabrication and future practical applications of the micro moving-coil linear compressor.
A1010	**Title: Predesign of Nodes of Cable Net for Umbrella Reflectors Based on Bezier Surface** **Authors:** Xin Jin，Xiaofei Ma，Yesen Fan and Qiang Xue **Abstract:** The umbrella antenna cable net is different from the ring truss antenna. Most umbrella antennas do not use triangular cable nets. In this case, a predesign method based on Bezier surface is proposed for a common umbrella antenna cable net, and the corresponding formula is derived. Finally, the accuracy of the surface of the reflector obtained by this method is verified. This method can quickly calculate the distribution of the reflector nodes meeting the engineering accuracy.

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