4th International Conference on Aerospace Technology, Communications and Energy Systems (ATCES 2020)

Conference Program

https://www.atces.org/

Conference organized by
Asia Pacific Institute of Science and Engineering (APISE)
Moscow Aviation Institute, Russia

Supported by
Samara University, Russia

Sept.25-27, 2020 ● Moscow, Russia

CONTENTS

WELCOME MESSAGE

Dear participants and guests of the 4th International Conference on Aerospace Technology, Communications and Energy Systems (ATCES 2020) – we could do this – our conference begins its work! This conference is a very small step in the development of world science, but I am sure we will do it with dignity. I congratulate everyone on this event, especially since it is taking place at a very difficult time.

Due to COVID-19 pandemic, we have decided to change the main conference, 4th International Conference on Aerospace Technology, Communications and Energy Systems (ATCES 2020) to be held online. ATCES 2020 is co-organized by Asia Pacific Institute of Science and Engineering (APISE) and Moscow Aviation Institute, supported by Samara University, which was planned to be held in Moscow, Russia from 25 to 27 September, 2020!

The change of conference format will not influence on our conference's aim and pursuit. ATCES 2020 aims to present the latest research related to Aerospace Technology, Communications and Energy Systems and other related topics. By on-line oral presentations and poster presentation, this conference provides opportunities for the participants to exchange ideas, to establish professional relationships for future collaborations.

We emphasize that the change of conference form will not have negative impact on papers' publication and indexing. All the registered and presented papers of ATCES 2020 will be included in the volume of **Conference Proceeding,** which will be submitted to **Engineering Village, Scopus, Thomson Reuters (WoS)** and other databases for review and indexing.

We would like to thank our outstanding Keynote Speakers: Prof. Ian McAndrew from Capitol Technology University, USA; Prof. Anatolii Kretov from Nanjing University of Aeronautics and Astronautics, China; Prof. Graham J F Hunt from Embry-Riddle Aeronautical University, USA; Prof. Dmytro Tiniakov from Nanjing University of Aeronautics and Astronautics, China and invited speakers: Prof. Tetiana Solianyk from National Aerospace University "Kharkiv Aviation Institute", Ukraine and Prof. Alexander Kusumov from Kazan National Research Technical University, Russia for sharing their deep insights on future challenges and trends.

We would like to thank all the committee members for their great support on organizing the conference and on reviewing the papers submitted to ATCES 2020, especially in such difficult circumstances. Special thanks to all the participants of the conference.

I would like to wish all participants of the conference a creative mood and confidence that this conference will give us all a new impetus and help everyone to make their own contribution to the development of science.

Prof. Kretov Anatolii

Nanjing University of Aeronautics and Astronautics, China

ATCES 2020 Conference Committee Chair

CONFERENCE SPEAKERS

Keynote Speakers

Prof. Ian McAndrew
Capitol Technology University, USA

Biography: Prof. Ian R. McAndrew PhD is a mechanical engineer that has worked in education for over 28 years. His teaching and research has been globally, starting in London and now with Embry Riddle Aeronautical University. He has taught in over 20 countries and published with many academics from all over the world. He has 5 degrees, also a qualified Electrical engineer and FRAeS. He has supervised over 30 PhDs and has 55 peer reviewed publications. His current research is in aerodynamics and low speed flight. He is a keen supporter of conferences as this is where junior researchers can develop their skills for a life in research. He is frequently invited to deliver Keynote speeches and is the Chair of several International Conferences. Additionally, he is the editor or assistant editor in chief of several International Journals.

Keynote Lecture: Communications systems and needs in aerospace engineering as unmanned becomes the norm.
Unmanned systems that are used in the air, land and sea are going to become a core part of life in the future. There are few examples of where it cannot change our way of life and in twenty years daily life patterns may be unrecognizable to us. Currently, most unmanned systems use communication systems that have practical cost and reliability but mirror human systems but also risks. Advanced satellite systems and ground communications are being increased to accommodate the increase and these are potentially replicating the same faults and concerns. The research supporting this and how lessons learned are presented and that being researched for critical infrastructure. It will discuss how advancements must address wider issues and what those are now and will in the future. This presentation will disseminate the wider issues and core subjects being research and present a focus on potential ways and also areas requiring more advance technology to solve.

Prof. Anatolii Kretov
Nanjing University of Aeronautics and Astronautics, China

Biography: Doctor Eng.Sc. (1999), professor (2002). He graduated from the Kazan Aviation Institute (Kazan national research technical University named after A. N. Tupolev-KAI). A. Kretov has research experience with the Central Aerohydrodynamic Institute (TSAGI) and with the Public Joint Stock company "Tupolev". Since 2015, A. Kretov has been a Professor at the Nanjing University of Aeronautics and Astronautics. His area of expertise is the design of high-speed aircraft and structures, as well as weight designing. He is the author of 80 articles and co-author of two books.

Keynote Lecture: On Structural Optimization and Its Features for the Structures with High Temperature
A brief historical overview of the problem on structural design is presented. Some features of the structural optimization for heated structures are discussed. An optimization algorithm for structures with heating performed from the elements with dissimilar mechanical characteristics is suggested. The solution of the problem is based on the use of optimality criterion method. The minimum

pliability of the construction is used as an optimization criterion under the condition of ensuring static equilibrium in the finite element formulation. The Lagrange multiplier method is used to obtain a recurrent formula for finding the optimal values of the design parameters. Topological optimization is performed by excluding passive elements from the initial most General structure by minimizing their rigidity. The contradiction in the work of the optimization algorithm from mechanical and thermal loads, built on the minimization of the potential deformation energy, is shown. Numerical analysis of typical examples is presented A numerical analysis of typical examples is presented and an assessment of the level of temperatures at which traditional design algorithms have an unstable solution and cannot be used to solve such problems is made. A criterion for evaluating the possibility of using the optimization algorithm on the temperature level is proposed.

Prof. Graham J F Hunt
Embry-Riddle Aeronautical University, USA

Biography: Graham Hunt started his professional career in the New Zealand Air Force and was honoured to be awarded a Defence Scholarship to undertake a Ph.D. in the United States. After completing his time in the Air Force Professor Hunt was invited to take up an appointment at Massey University in New Zealand. His growing focus at the university was on how to create professional aviation as a university-based discipline, especially involving the development of airline pilots, maintenance engineers and aviation managers. The Vice-Chancellor of the day was intrigued with his ideas and eventually agreed with the concept. The achievement was a first in Australia or New Zealand. He became founding professor and Dean of the School of Aviation at Massey University (1990-2004).

Graham believed that all regulatory requirements to be an airline pilot, air traffic manager, or aeronautical engineer should be embedded in university academic requirements and procedures. These should then be approved by the national regulatory authority and endorsed by the International Civil Aviation Organization (ICAO). This too was supported by ICAO and various international learned associations such as the Royal Aeronautical Society (RAeS).

Key to these ideas was the development of a better understanding of what competencies should be the focus of education and training for each of the professional activities in aviation, now and into the future and concurrently, resolving the question “what is a competency”? With the global impact of COVID-19 and the sweeping changes that are likely to result, these issues are now even more important to understand and resolve.

In 2008 Professor Hunt was invited by Embry-Riddle Aeronautical University (ERAU) in Florida, USA to establish a new Asia campus for the university in Singapore. In the 12 years he worked with ERAU in Asia he became increasingly focused on developing a “global aviation university” application to the successful model that some universities have more recently created in their own countries and cities.

In January 2019 Graham created “COBEAT Aviation Asia” in Singapore to develop this model further.

Keynote Lecture: Building a post COVID-19 Aviation Industry

Major mid-century changes in aviation’s regulatory system began to occur from December 7, 1944 with the creation of the signing of the Convention of International Civil Aviation in Chicago. Although this was a great start followed in May 1947 with the United Nations recognition of the International Civil Aviation Organization (ICAO) as a specialized agency for international aviation, the Standards and Recommended Practices recognized by ICAO have not always achieved what they were intended to do. As an example, the aviation industry is very free with the use of the term

"competency". More often than not the term is understood to refer to a range of skills that a particular industry sector (operational, manufacturing, research, etc.) requires its workforce to acquire through training or education and then be capable of demonstrating those alleged outcomes on the job. However, there is often little agreement by key players on what these skills really are, how they should be acquired and most importantly, what they should be in the future and how they should be assessed. The ramifications of COVID-19 suggest that there will be major changes as to how this industry will operate in the future and what kinds of knowledge and skills will be required to move forward. This paper raises some of the issues which need to be addressed as aviation focuses on the next generation of professionals that will be needed to safely apply the systems and technologies of the future.

Prof. Dmytro Tiniakov
Nanjing University of Aeronautics and Astronautics, China

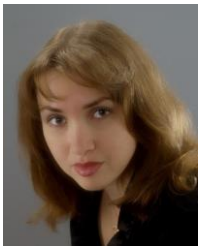
Biography: Dmytro V. TINIAKOV has completed his PhD at the age of 37 years at the National Aerospace University of Ukraine, Kharkov. He worked the Associate Professor of Airplane and Helicopter Design Department. He was: 1st Vice-dean of the Aircraft Engineering faculty, Head of the Pre-university Learning Department, Communicate Manager with State Company ANTONOV, Invited Professor in State Company ANTONOV. Prof. Dmytro Tiniakov is Vice-Winner as the best lecturer in special engineering courses of the University in 2013 competition "IKAR KhAI", National aerospace university.

Now He operates the Associate Professor of Nanjing University of Aeronautics and Astronautics at the Civil Aviation College. He is Invited Professor in the Sichuan University. He has published approximate 29 papers in reputed journals, 27 conference abstracts, 1 patent, coauthor of 9 books in Ukraine and in China. He was 2 times the Keynote speaker in International Conferences. Also, He participated in 1 State research project in Ukraine and some Province projects in China. The main research direction is rational designing of the transport category aircraft.

Keynote Lecture: Information Analysis Of Modifications To Increase Fuel Efficiency In Regional Passenger Jets

Fuel efficiency is one of the most important parameters for the estimation of efficiency of passenger transport category airplanes. The level of fuel efficiency depends on the specific fuel consumption of engines, aerodynamic cleanliness and weight efficiency of the aircraft, and its passenger capacity (weight-lifting ability). Ceteris paribus, lower fuel consumption by an aircraft renders less cost for airlines operating this type of aircraft. The objective of airline profitability depends directly on its aircraft operating economics and upon its compliance with international requirements for safety and ecology. Reducing fuel consumption has the most positive impact on the environmental performance of aircraft. It also decreases carbon dioxide emissions into atmosphere. This paper examines the fuel efficiency of a range of Ukrainian, Russian, American and European passenger aircraft, and statistical data considering their era of design and production as well as the volume of their transport operations is presented and analyzed. It is shown that the improvement of fuel efficiency is crucial in their operation. Informational models for fuel efficiency for flight and hourly capacity are given. By using fuel efficiency parameters, analytical models based on a comparison of regional jets with passenger capacities of up to 110 people are solved, and, based on this research, some findings on their effectiveness are presented.

Invited Speaker



Prof. Tetiana Solianyk
National Aerospace University "Kharkiv Aviation Institute", Ukraine

Biography: Tetiana M. SOLIANYK completed her PhD at the age of 29 years at the National Aerospace University "Kharkiv Aviation Institute", Kharkiv, Ukraine. She also obtained the title of assistant professor in 2019 and got FCE B2 level certificate in English. She was Vice-dean of the Aircraft Control Systems Faculty, Head of the Pre-university Learning Department.

Now she works as the Associate Professor of Aerohydrodynamics Department of Aircraft Design faculty. She is one of the Communicate Manager between Aerohydrodynamics department and foreign delegations from different universities and countries. She has published approximate 30 papers in reputed journals, 20 conference abstracts, coauthor of 4 scientific and methodological manuals in Ukraine. She participated in 3 State research projects in Ukraine. The main teaching subjects are Hydraulics; Hydraulic and pneumatic systems; Flight Dynamics. The main research direction is determination of aerodynamic characteristics of aircraft.

Invited Lecture: Distinctive features of the approach to determine aircraft aerodynamic characteristics in subsonic wind tunnels

Nowadays, a wind tunnel experiment is still the main approach to determine the aerodynamic characteristics of different objects, especially regarding such complex and expensive one as an advanced aircraft. The paper contains the detailed information about aerodynamic complex based on the Aerohydrodynamics Department of National Aerospace University "Kharkiv aviation institute". The complex consists of supersonic and subsonic wind tunnels with close and open working sections that are involved in study process and scientific investigations. This equipment allows determining the characteristics of different aircraft as well as other kind of transport such as overland, marine and submarine ones in the wide range of velocities and altitudes. The process of wind tunnel experiment is described. The specifics of getting the aerodynamics characteristics of an aircraft that is flying on the big attack angles are considered. The comparison between results, which is obtained in the wind tunnels and those that is got by other different contemporary approaches such as theoretical analytical calculation and numerical simulation has been performed. The given speech may be interesting to aviation engineers or to those specialists who are involved in design of an aeronautical equipment.

Prof. Alexander Kusumov
Kazan National Research Technical University, Russia

Biography: Alexander N. Kusyumov has been working in Kazan National Research Technical University n. a. A.N. Tupolev (KNRTU-KAI, former Kazan Aviation Institution) since 1984. He has completed a PhD in 1989 and Doctor Degree Dissertation in 2004 at KNRTU-KAI. At KNRTU-KAI different time he had appointments as an engineer, head of the aerodynamic laboratory, lecturer of the aerodynamic department. In November 2011 and February 2012 he visited Liverpool University as an honorary fellow of Engineering School and Glasgow University Engineering School in March 2019 as a visiting academic with an Affiliated status.

The current time he has appointment as a Professor of the aerodynamic department of

KNRTU-KAI. He has published more 20 papers in reputed journals, 2 patents, author and co-author of 2 books. Also, he participated in several State research projects in the Russian Federation. The main research directions are Computational Fluid Dynamics (CFD) of a helicopter, including rotor aeroacoustics.

Invited Lecture: CFD Simulation of Helicopter Rotor Flow Based on Unsteady Actuator Disk Model

Actuator disks (AD) can provide characterizations of rotor wakes while reducing the computational expense associated with modeling the fully resolved blades. An unsteady AD method based on AD surface circulation distribution combined with empirical data, Blade Element Theory and Rotor Momentum Theory is considered. The nonuniform circulation distribution accounts for 3D blade load effects, and in particular, tip loses. Numerical simulations were conducted for the isolated Pressure Sensitive Paint model rotor blade in hover and forward flight using the HMB3 CFD solver of Glasgow University. Validation of CFD results in comparison with published numerical data including the Kokurek and Tangler results was performed in hover, for a range of blade pitch angles using fully turbulent flow and the k- SST model. In forward flight, the vortex structures predicted using the unsteady actuator disk model showed configurations similar to the ones obtained using fully resolved rotor blades. Despite the reduced grid cells number, the CFD results for AD models captured well the main vortical structures around the rotor disk in comparison to the fully resolved cases.

PRESENTATION PROGRAMME OVERVIEW

Date	Time	Programme
Sept. 25, 2020	9:30-9:40	Opening Ceremony
	9:40-10:20	Keynote Speech 1 Prof. Ian McAndrew
	10:20-11:00	Keynote Speech 2 Prof. Anatolii Kretov
	11:00-11:40	Keynote Speech 3 Prof. Graham J F Hunt
	11:40-14:00	Lunch
	14:00-14:40	Keynote Speech 4 Prof. Dmytro Tiniakov
	14:40-15:10	Invited Speech 1 Prof. Tetiana Solianyk
	15:10-15:40	Invited Speech 2 Prof. Alexander Kusumov
	15:40-16:40	Technical Session
	16:40-16:50	Poster Session
	16:50-17:00	Closing Ceremony

INSTRUCTIONS TO PRESENTATIONS

Materials Prepared and Provided by the Presenters:

Oral Presenter:
PowerPoint or PDF files
Duration of each Presentation (Tentatively 15 minutes)
Laptops (with MS-Office & Adobe Reader)

Poster Presenter:
Poster: color printing; Add Conference Name's Acronym on the top of poster (Such as "ATCES 2020" and paper ID)

Minutes of Q&A

Keynote Speech: 35 Minutes of Presentation and 5 minutes' Q&A
Invited Speech: 25 minutes of Presentation and 5 minutes' Q&A
Presenter: 10 Minutes of Presentation and 5 minutes' Q&A

Online Presentation Guide:

1) The online presenter shall download the defaulted tool/software on the presenter's own computer, which will be notified by the organizing group ahead.
2) When there is presenter giving a talk, others will be mute by the administrator. After each talk, other audience can push the "raise your hands" button, then the presenter and audience will go on Q&A process.
3) When giving a talk on-line, the presenter shall push the "sharing in the group" button, then everyone will watch the PPT online. And the presenter shall set "sharing voice in the PPT".

NOTICE:

- Certificate of Participation will be awarded after the conference finished via fast delivery.
- One best presentation will be selected from each session. The best one will be announced when each session ends, and will be awarded with a "Best Presentation" certificate.

Online Video Conference Operation Guide via VooV

● Conference Information:

Theme：**ATCES 2020**
Time: **9:30 a.m. Sept. 25, 2020 (Beijing time)**

Link https://meeting.tencent.com/s/65c3bhB0BFNK
Conference ID: 891 658 418

● Testing:

All the participants can join the conference room during the testing time, the conference secretary will arrange the participants who will do the oral presentation to test one by one.
Testing Time: **15:00-16:30, Sept.22, 2020 (Beijing time)**
Link https://meeting.tencent.com/s/65c3bhB0BFNK
Testing ID: 891 658 418
*Note: The testing link and ID is the same as conference link and ID on Sept. 25, 2020.

● Operation Guide:

1. Video meeting software): VooV

Download link：

A.) Chinese Version
https://meeting.tencent.com/download-mac.html?from=1001&fromSource=1 (Mac OS)
https://meeting.tencent.com/download-win.html?from=1001&fromSource=1
(Windows)

B.) International Version
https://voovmeeting.com/download/darwin（Mac OS）
https://voovmeeting.com/download/windows （Windows）

2. Join the Conference:

Method 1: Click the Conference link (https://meeting.tencent.com/s/65c3bhB0BFNK), or click "Join the conference", then input the Conference ID: 891 658 418. When you join the conference room, you need to fill in your phone number for authentication, then fill in your "Paper ID +Name" at the "Name" to join the conference.

Method 2: You can register at the APP/ website (https://www.voovmeeting.com/), log in and join the conference by the link or tap the Conference ID.

● Note:

- The conference committee will **call the roll 5 minutes before** our conference, please join the conference in advance for at least 5 minutes. The conference secretaries will be waiting since 9:00.

- Please **wear headphones** during the meeting to block out the outside noise. Keeping the video on and keeping online are suggested.

- Please test the video meeting software in advance.

- During the poster session, we will upload all the poster files in the "meeting room". For learning more about posters, you could download the files to read only. But please note that, all materials have not been published, please **respect the paper originality and copyright.**

- *Note: Since International version does not support the function of file transmission, we recommend you to download Chinese version, then you can upload and download file smoothly. If Chinese version is not available in your country or region, you can download International version; as for e-posters, we could email you via email box once you requested.

- Please follow WeChat for Consultation (**APISE17358663189**) for more information. ATCES 2020 Wechat Group will update conference information in realtime.

- Should you have any further questions about this operation guide, please click https://www.voovmeeting.com/ for help. You can also contact the conference secretary at +86-17723329879(China), +852-30506939 (Hong Kong).

TECHNICAL SESSION

Keynote Speech Session 9:40-11:40, Sept.25, Friday			
Time	**No.**	**Content**	**Page**
9:40-10:20	KN1	Communications systems and needs in aerospace engineering as unmanned becomes the norm ***Prof. Ian McAndrew,*** Capitol Technology University, USA	2
10:20-11:00	KN2	On Structural Optimization and Its Features for the Structures with High Temperature ***Prof. Anatolii Kretov,*** Nanjing University of Aeronautics and Astronautics, China	2
11:00-11:40	KN3	Building a post COVID-19 Aviation Industry ***Prof. Graham J F Hunt,*** Embry-Riddle Aeronautical University, USA	3
11:40-14:00	**Lunch**		
Keynote Speech and Invited Speech Session 14:00-15:20, Sept.25, Friday			
14:00-14:40	KN4	Information Analysis Of Modifications To Increase Fuel Efficiency In Regional Passenger Jets ***Prof. Dmytro Tiniakov,*** Nanjing University of Aeronautics and Astronautics, China	4
14:40-15:10	IS1	Distinctive features of the approach to determine aircraft aerodynamic characteristics in subsonic wind tunnels ***Prof. Tetiana Solianyk,*** National Aerospace University “Kharkiv Aviation Institute”, Ukraine	5
15:10-15:40	IS2	CFD Simulation of Helicopter Rotor Flow Based on Unsteady Actuator Disk Model ***Prof. Alexander Kusumov,*** Kazan National Research Technical University, Russia	5

Technical Session Session Chair: Prof. Dmytro Tiniakov 15:40-16:40, Sept.25, Friday			
15:40-15:55	A003	Study of Tail Rudder Deflection Angles for Stabilizing the Twin Turboprop Small Passenger Aircraft in Critical Flight due to One Engine Failed Condition ***Yuke Vahira Agatha,*** Universitas Indonesia, Indonesia	14
15:55-16:10	A1005	Estimation of salvation possibility for reusability of the launch vehicle elements ***Temur Usmonov,*** Nanjing University of Aeronautics and Astronautics, China	14
16:10-16:25	A1006	Influence of high temperatures on the structural optimization ***Anatolii Kretov,*** Nanjing University of Aeronautics and Astronautics, China	15
16:25-16:40	A1009	Small Satellite Magnetic Control Study Based on Simulator Testbed ***Jhonny Uscategui Parra,*** Beihang University, China	15
16:40-16:50	**Poster Session**		
16:50-17:00	**Closing Ceremony**		

Poster Session 16:40-16:50, Sept.25, Friday	
A006	Research and Application of Model-Based Systems Engineering for Aircraft Interface Development ***Chen Wu,*** Commercial Aircraft Corporation of China, China
A007	Fast prediction method of pressure emergency time for manned spacecraft based on total pressure change rate ***Peng Sun,*** China Astronaut Research and Training Center, China
A1008	Simulation Research on the Influence of Basic Airfoil Oblique Angle on the Aerodynamic Characteristics of Forward Swept Airfoil ***Zhao Xiwei,*** PLA Air Force Engineering University, China
A1010	Stability analysis of nut coefficient of aero-engine rotor connection bolt ***Zhao Bing,*** Tsinghua University, China

ABSTRACT

Technical Session	
Time	**Content**
15:40-15:55	**A003:** Study of Tail Rudder Deflection Angles for Stabilizing the Twin Turboprop Small Passenger Aircraft in Critical Flight due to One Engine Failed Condition **Presenter:** ***Yuke Vahira Agatha,*** Universitas Indonesia, Indonesia **Abstract:** An aircraft must have durability, whether for normal flight condition and for a critical flight condition. One of the critical flight conditions of a twin-engines aircraft is the failure of one engine while the aircraft is cruising. The aircraft with only one live engine on will still have enough power to generate thrust. However, the aircraft will experience a moment couple due to the thrust on the remaining engine that makes the aircraft to yaw. This yaw effect must be compensated by the flight control in order to maintain a stable flight condition. The rudder as one of the flight control systems manages the aircraft yaw motion. So, therefore the rudder deflection angle must be set properly as a treatment to overcome the moment force of the live engine. Study to determine best approximated optimum rudder deflection angle setting were conducted to get the figures of how the counter side forces generated on the rudder can maintain a stable flight. The result of the study can be applied as important guidance for a pilot to control the aircraft in a critical flight condition due to one engine fails. Considerations on the strength and integrity of the rudder structure especially at the hinge pivot points between the dynamic and the static parts are taken account as well.
15:55-16:10	**A1005:** Estimation of salvation possibility for reusability of the launch vehicle elements **Presenter:** ***Temur Usmonov,*** Nanjing University of Aeronautics and Astronautics, China **Abstract:** In this paper, some facts related to the reusable systems of launch vehicles are described. The authors have proposed a classification of rescue methods, a simple engineering model, that allows an operational assessment of the impact of additional masses associated with the salvation of the stage or its individual elements on the mass of the target load being placed into low earth orbit, as a first approximation. As the main criterion for evaluating the effectiveness of choosing a rescue method, the cost of removing 1 kg of payload to low earth orbit is considered. The most promising way to save the elements for reusability, the authors consider the aerospace parachute system, which opens immediately after the separation of the stage. Salvation systems for Falcon-9 and Soyuz-5M launch vehicles are considered as examples, since these ones can be the main ways to rescue launch vehicles stages or their engine blocks in the near future.

16:10-16:25	**A1006:** Influence of high temperatures on the structural optimization **Presenter:** ***Anatolii Kretov,*** Nanjing University of Aeronautics and Astronautics, China **Abstract:** An algorithm for optimizing of load-carrying structures is proposed. Load-bearing elements have heating of high level and different mechanical characteristics. The solution of this problem is based on the use of the optimality criterion method. The minimum pliability of the structure is used as an optimization criterion, provided that static equilibrium is maintained in the finite element formulation. To obtain a recurrent formula for finding the optimal values of the calculated parameters, the Lagrange multiplier method is used. Topological optimization is performed by excluding passive elements from the original most General structure. A contradiction is shown in the operation of the optimization algorithm for mechanical and thermal loads based on minimizing the potential energy of deformation. The optimization uses the concept of pseudo-elastic modulus of elasticity, which allows identifying problematic heated elements that require special optimization approaches. The criterion for applying the optimization algorithm is determined, which is related to the contradictions of solving the problem with simultaneous action of mechanical and thermal loads. A numerical analysis of typical examples is presented.
16:25-16:40	**A1009:** Small Satellite Magnetic Control Study Based on Simulator Testbed **Presenter:** ***Jhonny Uscategui Parra,*** Beihang University, China **Abstract:** In the present research, the Small Satellite Magnetic Control Study based on Magnetic Simulator Testbed (MSTB) was carry out through a pair of Helmholtz coils (HC) for each one coordinate axis (X, Y, Z). Each group of coil was able to generate a stable and long magnetic field that simulates the same one around the Earth with a confident level of precision, to realize the Small Satellite Magnetic Control Study. Matlab/Simulink software was used to perform the satellite's orbit propagation, to calculate the magnetic field of the Earth around satellite's orbit and simulates a pair of Helmholtz coils for each one coordinate axis of the satellite to reproduce the magnetic field of the Earth applying the Law of Biot-Savart. The satellite orbit ś propagation, as well as the calculations of the magnetic field of the Earth and the replication of the magnetic field using the MSTB, produced highly satisfactory results which are very close to those obtained by important research previously consulted, providing confidence to this investigation and allowing to perform the magnetic control study for Small Satellite with a high level of precision.

CONFERENCE COMMITTEE

Honorable Chair

Alexander M. Mebel, Florida International University, USA

Wagdi G. Habashi, McGill University, Canada

Conference Committee Co-Chair

Kretov Anatolii, Nanjing University of Aeronautics and Astronautics, China

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

Program Committee

Mikhail Kolotnikov, Research Institute of Mechanics , Moscow State University, Russia

S. A. Channiwala, S. V. National Institute of Technology, Surat, India

Xavier Fernando, Ryerson University, Canada

Yaser Qudaih, Higher Colleges of Technology (HCT), Dubai, UAE

Financial Chair

Jinping Lei, The Hong Kong University of Science and Technology, Hong Kong S. A. R., China

Local Committee

Dmitry A. Uglanov, Samara University, Russia(Chair)

Technical Committee Member

Adel A. Elbaset, Minia University, Egypt

Aleksandr A. Igolkin, Samara University, Russia

Abdelghani Chahmi, University of Sciences and Technology of Oran, Algeria

Aleksandr S.Vinogradov, Samara University, Russia

Dmitry K. Novikov, Samara University, Russia

Elena Vishnevskaya, Embry Riddle Aeronautical University, Spangdahlem Campus, Germany

Fred Barez, San Jose State University, USA

Guelailia Ahmed, Satellite Developement Center, Algerian Space Agency, Algeria

Hassan Migdadi, American university of Madaba, Jordan

NOTE