



**INTERNATIONAL
CONFERENCE
ON HIGH-SPEED
VEHICLE SCIENCE
& TECHNOLOGY**

Conference Guide

**November 25—29, 2018
Moscow, Russia**



**1918–2018
TsAGI
100**

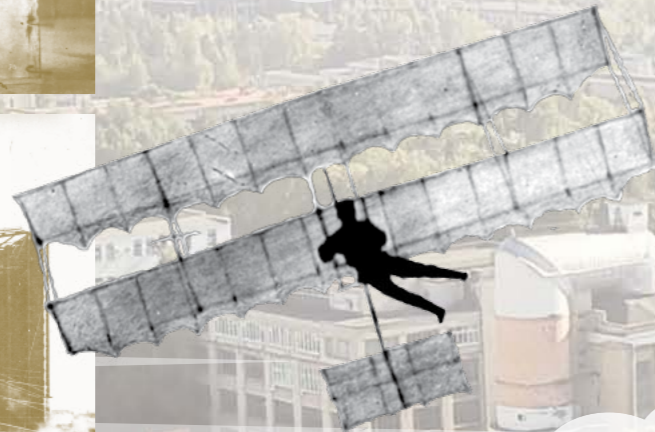
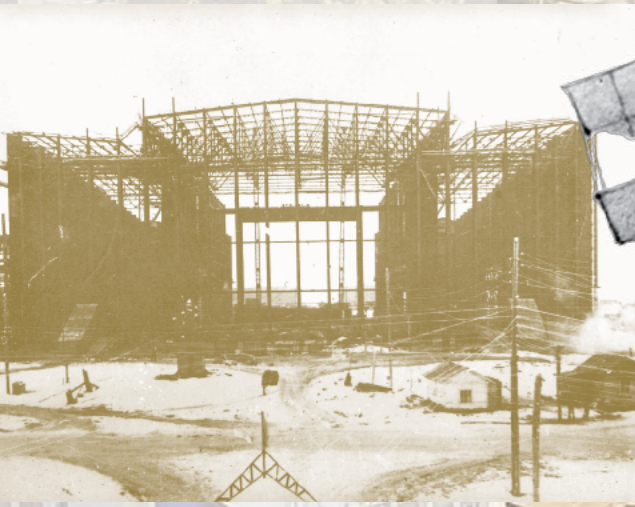




Founded in 1918 by initiative of Prof. N. E. Zhukovsky, 100 years of technology excellence



1918-2018
TsAGI
100

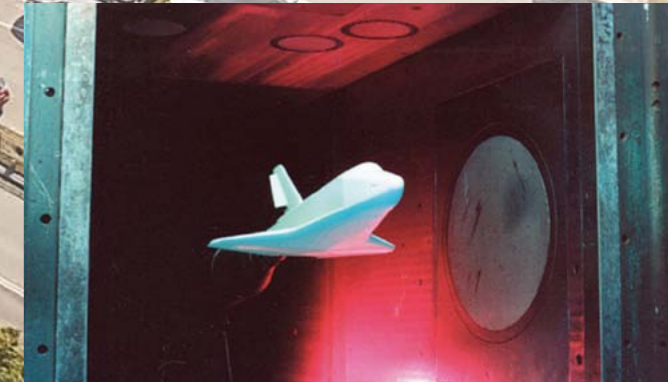
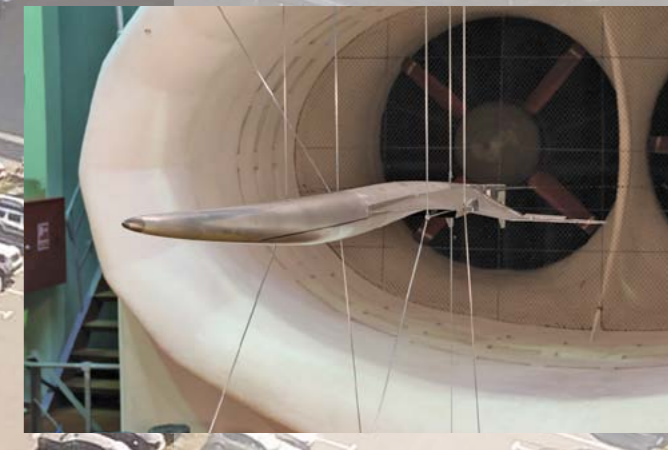
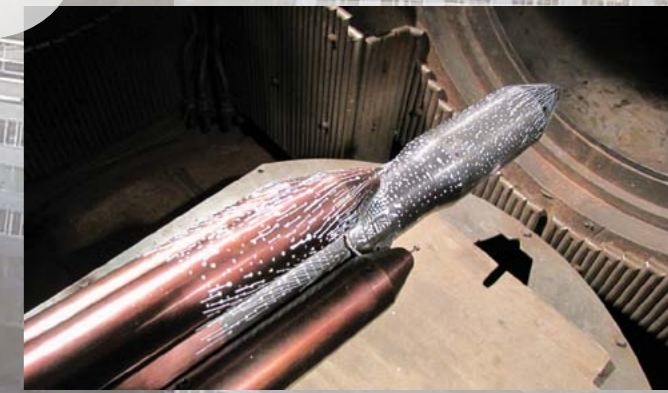
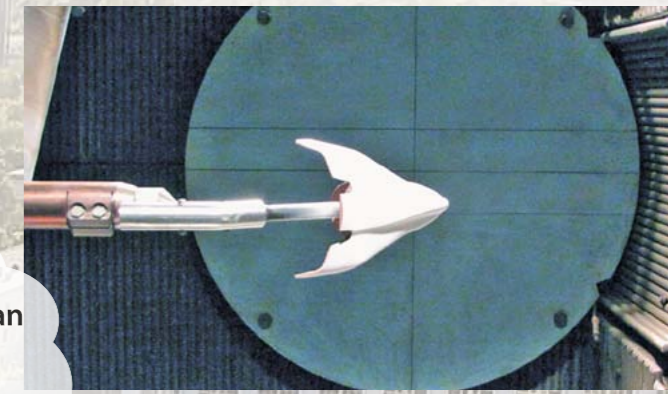
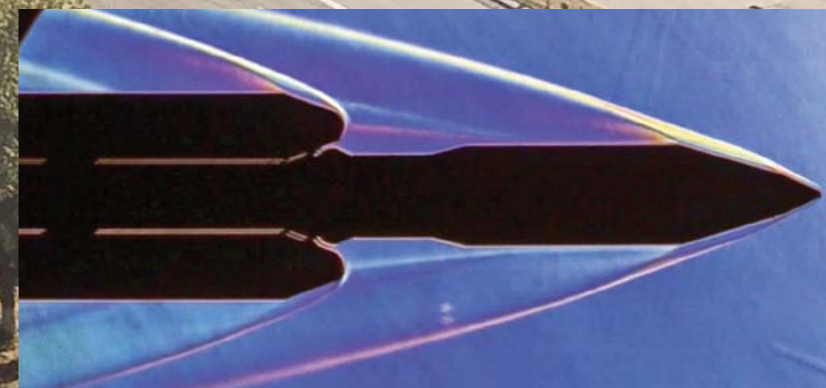
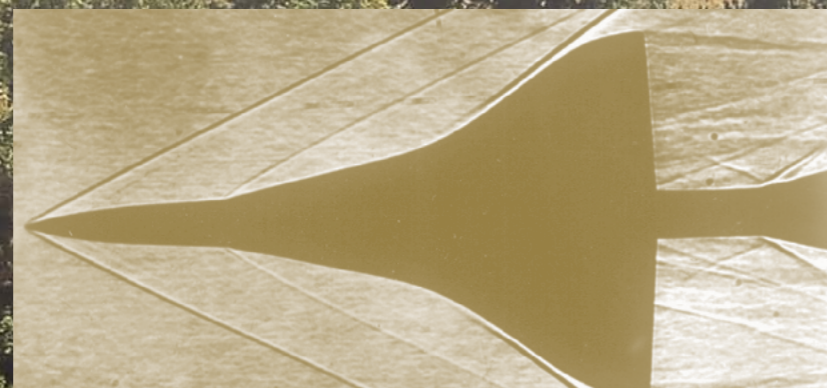
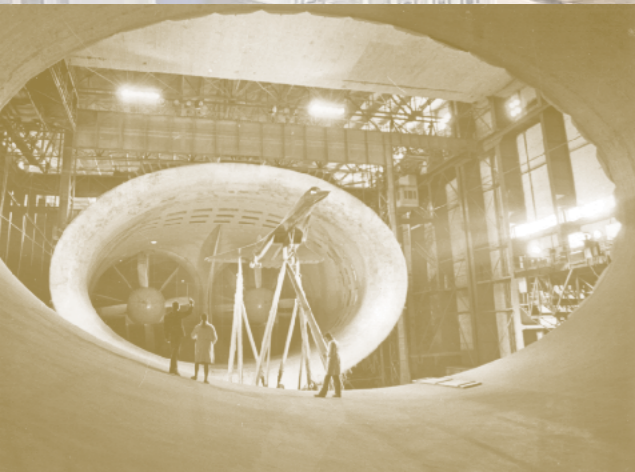


Leading aerospace research and development center of Russia

Over 100 unique testing facilities in a single location

More than 4.500 employees

TsAGI cooperates with more than 50 leading world aeronautical companies and research centers. 600 international contracts have been performed for 25 years





Kirill Sypalo
General Director,
Professor

*Central Aerohydrodynamic
Institute
n. a. prof. N. E. Zhukovsky
(TsAGI), Russia*

Sergey Chernyshev
Chief Scientific Officer,
Professor

*Central Aerohydrodynamic
Institute
n. a. prof. N. E. Zhukovsky
(TsAGI), Russia*



Dear HiSST participants, our colleagues and guests,

It's a great honor for us to welcome you on the 1st International Conference on High-Speed Vehicle Science and Technologies (HiSST). This HiSST Conference is a great opportunity to discuss the latest results and achievements. The theme of this conference (supersonic and hypersonic systems and technologies) is a cutting edge in the aeronautical science, so, in our opinion, progress in this field is possible only in close collaboration and permanent discussions among researchers. Our conference is truly international, as it brings together experts in the field of high-speed aircraft from around the world, and this is the basis of the conference determined by the international Technical Committee. It's great that there are several extensive international projects in this field nowadays. We hope that this conference will be a forum to reveal new themes for possible collaboration in the future.

TsAGI was chosen to be a host of the 1st HiSST Conference not only for long and interesting history of hypersonic sciences and researches and for its significant role in creating many supersonic and hypersonic vehicles. 1st of December 2018 is a centennial anniversary of TsAGI, it was founded by the famous researcher

and a pioneer of aviation Professor Nikolay Zhukovsky who became the first Director. We think the fact that the founding and holding of the 1st HiSST conference takes place as part of the celebration of the 100th anniversary of TsAGI is not accidental. This fact has a deep meaning: the birth and successful development of a new phenomenon — HiSST is possible only if it has such deep and strong roots as the 100-year history of TsAGI. During these 100 years we were on a leading role in field of aeronautical research, so this Conference is a great possibility for the participants to get some academic exchange. We hope that this experience will be a good promotion for organizing next HiSST Conferences all around the world.

We hope that you will enjoy not only the Conference itself but also Moscow at the end of the autumn. Please, don't lose the possibility to visit beautiful galleries, theaters, museums, parks. In spite of the weather, you will definitely get some warm unforgettable memories that could promote you to visit Russia again.

Have a good time at the HiSST Conference and around!

Dear conference participants and colleagues,

As the chairman of the 1st International Conference on High-Speed Vehicle Science and Technologies (HiSST), I welcome you to our 2018 event at the beautiful Metropol Hotel in Moscow. Our host here in Russia is TsAGI represented by Chief Scientific Officer, Prof. Sergey Chernyshev. Our primary reason to hold this conference here in Moscow in 2018 is to join our colleagues from TsAGI in their 100-year anniversary celebrations. We thank TsAGI for inviting us and we send our congratulations.

We aim to increase global visibility of competences, events and publications on high-speed vehicle science and technology and support the sharing of research and development results in the above-mentioned fields among subject matter experts by elaborating links with the different national entities on governmental, industrial and research level of the representing countries.

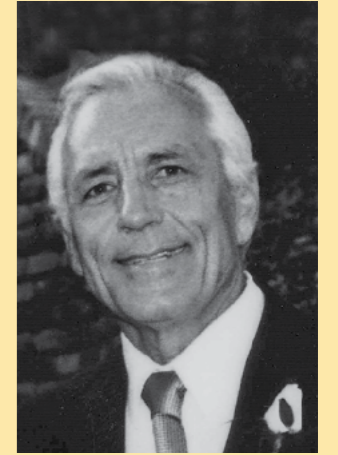
We encourage scientists to publish the outcome of their research in significant peer-reviewed Aeronautical and Space Journals. We promote dedicated international HiSST conferences to ensure this exchange on a multi-national level.

The International HiSST Conference typically takes place every 18 months and is supported by a multi-national HiSST Conference Committee which will orchestrate and hold this conference around the globe at regular intervals. To realize the intent of the above

statements, we are operating in partnership with an Aeronautical and Aerospace Society. The selected Aeronautical and Aerospace Society and HiSST partner is the Council of European Aerospace Societies (CEAS) represented at this conference by its chairman, Christophe Hermans.

We have assembled a stellar program giving conference attendees valuable insight into the current state of spaceplane and hypersonic programs some of which benefit from existing and evolving international collaborations. Our program opens with keynote welcome speeches from (please fill in names, titles, and affiliation). During the next four days we have organized a total of six plenary sessions addressing relevant topics and a total of (please fill in number of paper manuscripts submitted) technical papers. We dedicated all of Tuesday afternoon for visits to nearby technical points of interest like TsAGI or CIAM. I encourage all conference attendees to take advantage of this opportunity to meet and interact with many of the world's premier experts in the field of high speed vehicles during the formal sessions and the various social events including the Gala Dinner on Wednesday evening. Thank you all very much for your dedication and participation. Without you this event would not be possible. Again, let me welcome you to the 1st HiSST Conference in Moscow, Russia.

Best wishes and blue skies!



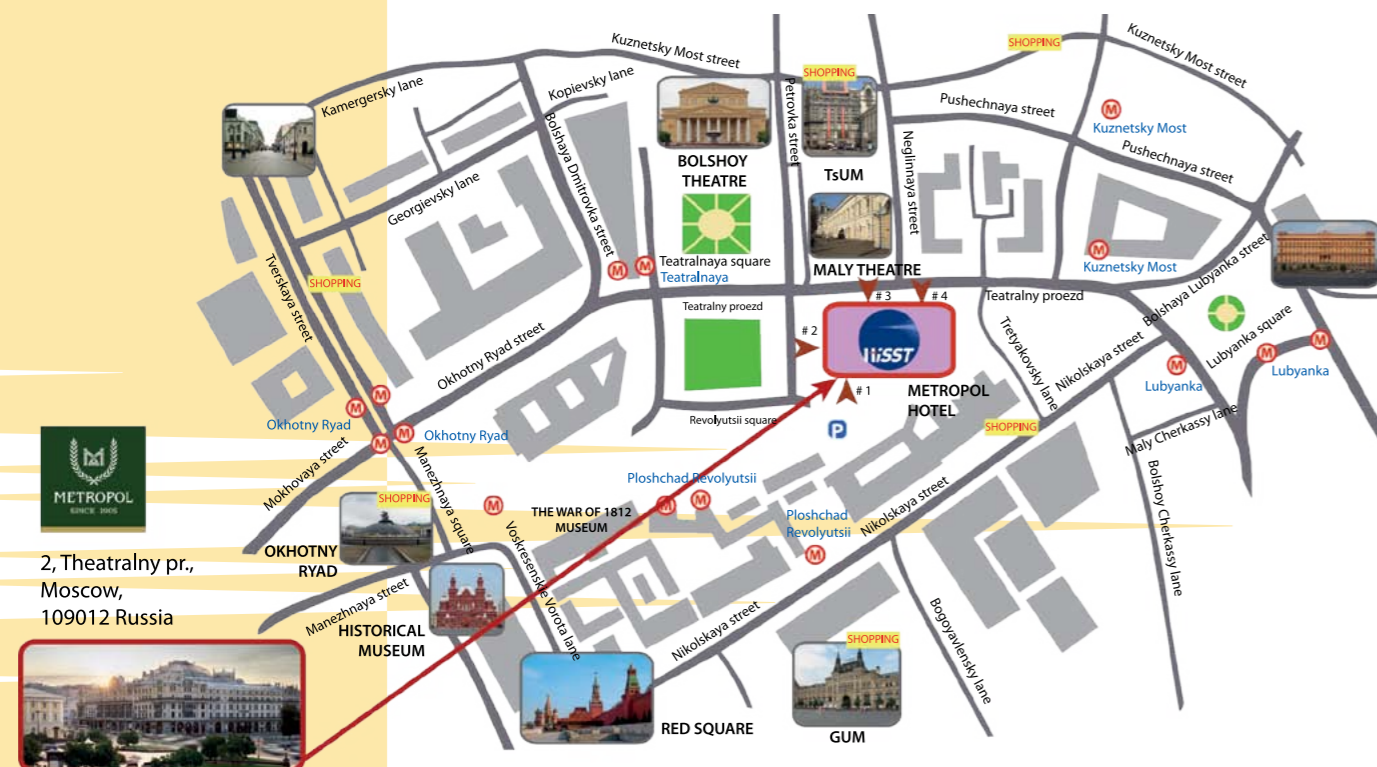
Adam Siebenhaar
Chairman HiSST
Technical Committee

Mach 7H, USA

Conference Venue

Hotel Metropol Moscow, a 5-star venue with unique architecture and rich history, comfortable accommodation for participants. The main sightseeing attractions

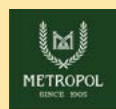
are within walking distance. Nearby points of interest: Bolshoi Theatre, Red Square, St. Basil's Cathedral, Kremlin, Gostiny Dvor, etc.



2, Teatralny pr., Moscow, 109012 Russia

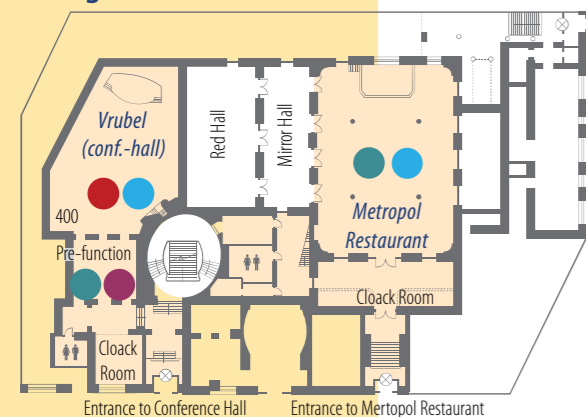


Halls Scheme

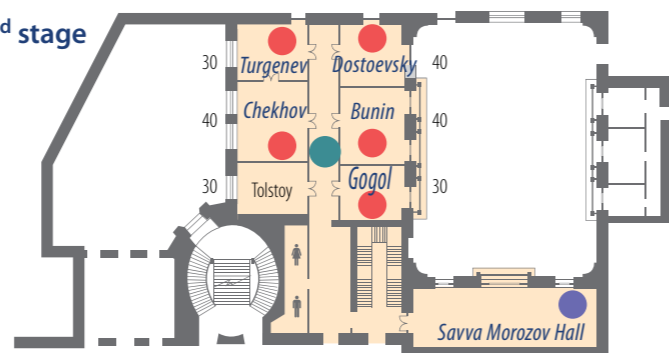


- Plenary & Science Session
- Science Session
- Coffee break
- Lunch
- Presentation loading
- Welcome
- Reception

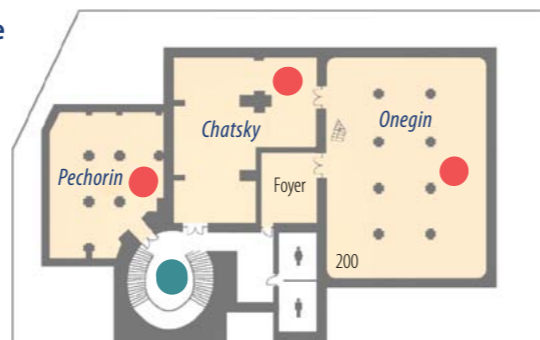
1st stage



2nd stage



0 stage



International Technical Committee

The HiSSST Technical Committee currently has representatives from 12 nations around the globe. These are:

- **Australia** Prof. Dr. Vincent Wheatley (Univ. of Queensland)
- **Brazil** Prof. Dr. Marco Sala Minucci (IEAv)
- **China** Dr. Lihong Chen (Chinese Academy of Sciences)
- **Europe** Prof. Dr. Johan Steelant (European Space Agency)
- **France** Dr. François Falempin (MBDA)
- **Germany** Prof. Dr. Klaus Hanneman (DLR)
- **Italy** Dr. Gennaro Russo (Trans-Tech)
- **Japan** Prof. Dr. Masataka Maita (JAXA)
- **Russia** Prof. Dr. Sergey Chernyshev (TsAGI)
- **South-Korea** Prof. Dr. Yung-Hwan Byun (Konkuk University)
- **United Kingdom** Prof. Dr. Matthew McGilvray (Univ. of Oxford)
- **United States** Dr. Adam Siebenhaar (Mach 7H)

Topics Abbreviation

Topic (full name)	Code	Topic (full name)	Code
Guidance & Control Systems	G&C	Operation and Environment	O&S
High-Speed Aerodynamics and Aerothermodynamics	A&A	Propulsion Systems and Components	PSC
Hypersonic Fundamentals and History	HFH	Test & Evaluation	T&E
Materials and Structures	M&S	Thermal, Energy and Management Systems	TEM
Missions and Vehicles	M&V		

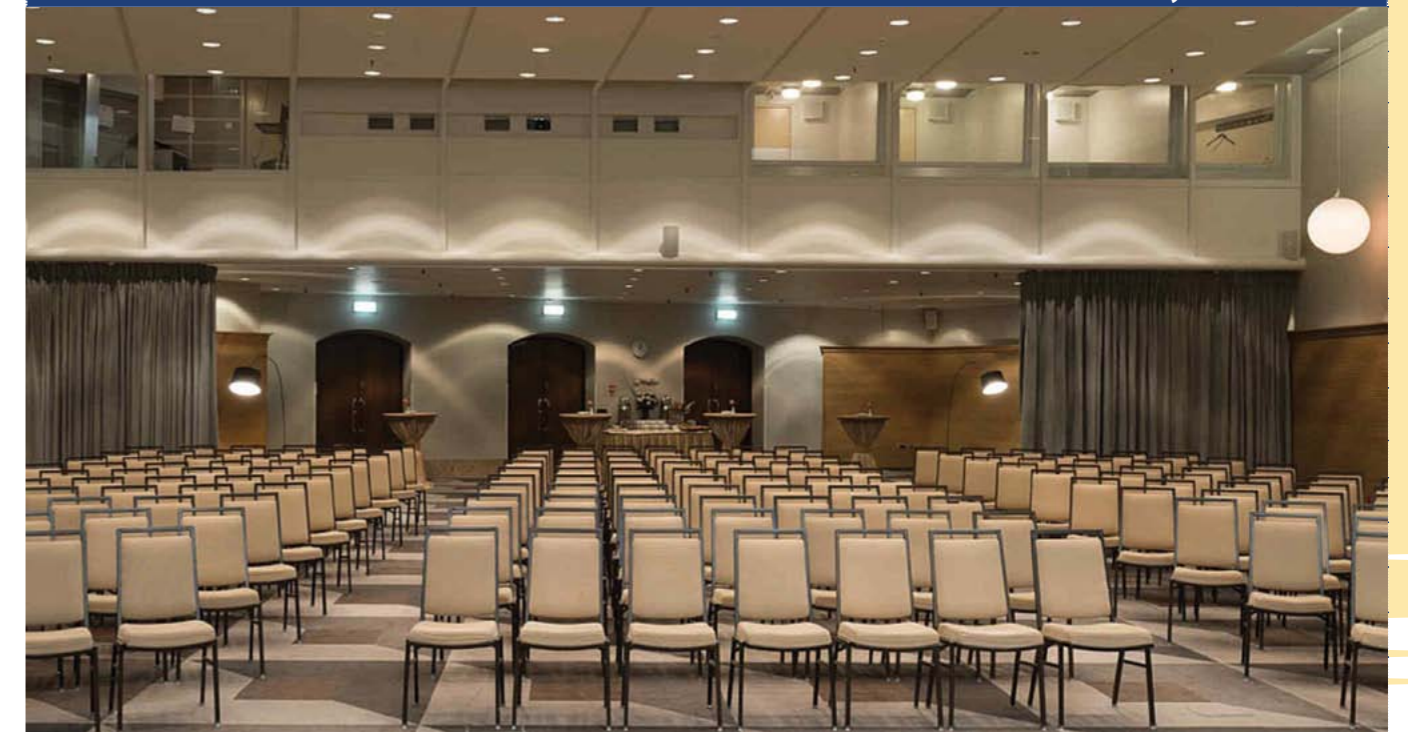
Two-digit Country Codes

Country	Code	Country	Code
Australia	AU	Korea (South)	KR
Austria	AT	Kyrgyzstan	KG
Belgium	BE	Netherlands	NL
Brazil	BR	Pakistan	PK
Canada	CA	Poland	PL
China	CN	Romania	RO
Czechia	CZ	Russia	RU
France	FR	Saudi Arabia	SA
Germany	DE	Singapore	SG
Ghana	GH	South African Republic	ZA
Hungary	HU	Spain	ES
India	IN	United Kingdom	GB
Italy	IT	USA	US
Japan	JP		

Sunday, November 25									
15:00	Registration (Gogol hall)								
18:00	Welcome Drinks (Bryusov & Savva Morozov halls)								
Monday, November 26									
08:30	Speaker's Briefing (Vrubel foyer)								
09:00	Welcome (Vrubel hall): Welcome Address, Host Speech, HiSST Partner Speech								
09:30	Global Review (Vrubel hall): Russia, Australia, Brazil, China								
11:30	Coffee Break								
12:00	Global Review (Vrubel hall): Europe, Japan, Korea								
13:30	Lunch								
14:30	Plenary 1 (Vrubel hall)								
15:30	Coffee Break								
	Hall	Onegin	Chatsky	Pechorin	Chekhov	Bunin	Gogol	Dostoevsky	Turgenev
16:00		PSC-1	A&A-1	PSC-2	A&A-2	T&E-1	O&S-1	M&S-1	M&V-1
16:30									
17:00									
17:30									
18:00	Reception (Vrubel hall)								
Tuesday, November 27									
08:30	Speaker's Briefing (Vrubel foyer)								
09:00	Plenary 2 (Vrubel hall)								
	Hall	Vrubel	Onegin	Pechorin	Chekhov	Bunin	Gogol	Dostoevsky	Turgenev
10:00		A&A-3	PSC-3	PSC-4	A&A-4	T&E-2	G&C-1	HFH-1	TEM-1
10:30									
11:00									
11:30	Coffee Break								
12:00		A&A-3	PSC-3	PSC-4	A&A-4	T&E-2	G&C-1	HFH-1	TEM-1
12:30									
13:00									
13:30	Lunch								
14:30									
...	Technical tours								
18:00									
18:30									
19:00	HiSST TC Dinner (Chekhov hall)								

Wednesday, November 28									
08:30	Speaker's Briefing (Vrubel foyer)								
09:00	Plenary 3 (Vrubel hall)								
	Hall	Vrubel	Onegin	Pechorin	Chekhov	Bunin	Gogol	Dostoevsky	Turgenev
10:00		A&A-5	PSC-5	PSC-6	A&A-6	T&E-4	G&C-2	T&E-3	M&V-2
10:30									
11:00									
11:30	Coffee Break								
12:00		A&A-5	PSC-5	PSC-6	A&A-6	T&E-4	G&C-2	T&E-3	M&V-2
12:30									
13:00									
13:30	Lunch								
14:30	Plenary 4 (Vrubel hall)								
15:30	Coffee Break								
	Hall	Vrubel	Onegin	Pechorin	Chekhov	Bunin	Gogol	Dostoevsky	
16:00		A&A-7	PSC-7	PSC-8	A&A-8	T&E-6	HFH-2	T&E-5	
16:30									
17:00									
17:30									
19:30	HiSST Gala Dinner (State Museum of A. S. Pushkin, 12/2, Prechistenko St.)								
Thursday, November 29 (am)									
08:30	Speaker's Briefing (Vrubel foyer)								
09:00	Plenary 5 (Vrubel hall)								
	Hall	Vrubel	Onegin	Pechorin	Bunin	Gogol	Dostoevsky	Turgenev	
10:00		HFH-3	PSC-9	T&E-7	M&V-3	G&C-3	M&S-2	TEM-2	
10:30									
11:00									
11:30	Coffee Break								
12:00		HFH-3	PSC-9	T&E-7	M&V-3	G&C-3	M&S-2	TEM-2	
12:30									
13:00									
13:30	Lunch								
14:30	Plenary 6 (Vrubel hall)								
15:30	Coffee Break								
	Hall	Vrubel	Onegin	Pechorin	Turgenev				
16:00		A&A-9	PSC-10	T&E-8	O&S-2				
16:30									
17:00									
17:30									
18:00	TsAGI Anniversary Ceremonial Reception (Metropol Hall)								

Monday, November 26				
08:30	Speaker's Briefing (<i>Vrubel foyer</i>)			
	Welcome (<i>Vrubel hall</i>)			
09:00	Welcome Address. <i>Adam Siebenhaar</i> (Mach 7H, USA)			
	Host Speech. <i>Sergey Chernyshev</i> (TsAGI, Russia)			
	HiSST Partner Speech. <i>Christophe Hermans</i> (CEAS)			
	Global Review (<i>Vrubel hall</i>)			Chair: <i>Adam Siebenhaar</i> (Mach 7H, USA)
09:30	Russia. <i>Sergey Drozdov</i> (TsAGI, Russia)	10:30	Brazil. <i>Marco Minucci</i> (IEAv, Brazil)	
10:00	Australia. <i>Adrian Pudsey</i> (RMIT, Australia)	11:00	China. <i>Lihong Chen</i> (CAS, China)	
11:30	Coffee Break			
	Global Review (<i>Vrubel hall</i>)			Chair: <i>Adam Siebenhaar</i> (Mach 7H, USA)
12:00	Europe. <i>Johan Steelant</i> (ESA-ESTEC, Netherlands)	12:30	Japan. <i>Hideyuki Tanno</i> (JAXA, Japan)	
		13:00	Korea. <i>Yunghwan Byun</i> (Konkuk University, Korea)	
13:30	Lunch			
14:30	Plenary 1 (<i>Vrubel hall</i>)			Session Chair: <i>Klaus Hannemann</i> (DLR, Germany)
	Hypersonic Flow Over a Cone in the Detached Shock Range. <i>Hans Hornung</i> (California Institute of Technology, USA)			
15:30	Coffee Break			
Hall	<i>Onegin</i>	<i>Chatsky</i>	<i>Pechorin</i>	<i>Chekhov</i>
Topic	PSC-1	A&A-1	PSC-2	A&A-2
Chair	<i>N. Kukshinov</i> (CIAM, RU); <i>V. Zhukov</i> (DLR, DE)	<i>M. Marini</i> (CIRA, IT); <i>A. Gubanov</i> (TsAGI, RU)	<i>P. Gerlinger</i> (Stuttgart Univ., DE); <i>Qing Li</i> (NUDT, CN)	<i>V. Golubkin</i> (TsAGI, RU); <i>A. Schettino</i> (CIRA, IT)
16:00	hisst-2018_11101019 Design, Numerical Analysis and Experimental Studies of Model High-Speed Propane Combustion Chamber. <i>V. Vlasenko, V. Sabelnikov, M. Ivankin, S. Molev, A. Nikolayev, V. Talyzin, A. Chevagin</i> (TsAGI, RU)	hisst-2018_3101062 ADVANCE: A Space Vehicle Analysis and Design Tool. <i>J. Steelant, J. Van den Eynde</i> (ESA-ESTEC, NL), <i>Ph. Reynier</i> (Ingénierie et Systèmes Avancés, FR)	hisst-2018_39701105 Coupled Fluid / Solid Numerical Investigation of the Heat Load on a Lobed Scramjet Strut Injector. <i>P. Gerlinger, Y. H. Simsont</i> (Stuttgart Univ., DE)	hisst-2018_2670918 Numerical Simulation of Transpiration Cooling Experiments in Supersonic Flow using OpenFOAM. <i>D. Prokein, J. von Wolfersdorf</i> (ITLR, DE), <i>C. Dittert, H. Böhrk</i> (DLR, DE)
16:30	hisst-2018_40101115 HEXAFLY-INT Facility Module Testing in High-Entropy Flow. <i>N. Kukshinov, V. Aleksandrov, A. Prokhorov, A. Rudinskiy</i> (CIAM, RU)	hisst-2018_1620897 High and Low Speed Analysis of a Re-usable Unmanned Re-entry Vehicle. <i>T. Bykerk, D. Verstraete</i> (Sydney Univ., AU), <i>G. Pezzella</i> (CIRA, IT), <i>A. Viviani</i> (Campania Univ., IT)	hisst-2018_40601123 The Effect of Combustion on the Dynamic Characteristics of the Supersonic Wake Flow. <i>Qing Li, Jianhan Liang</i> (NUDT, CN)	hisst-2018_16501075 Experimental Investigation of the Boundary Layer State Hysteresis and its Influence on the Starting of the Streamline-Traced Intake. <i>V. Golubkin, S. Aleshin, A. Gubanov, I. Nazhimov, V. Talyzin, Yu. Shvalev, V. Yakovleva</i> (TsAGI, RU)

Monday, November 26				
				
	<i>Bunin</i>	<i>Gogol</i>	<i>Dostoevsky</i>	<i>Turgenev</i>
	T&E-1	O&S-1	M&S-1	M&V-1
Chair	<i>S. Drozdov</i> (TsAGI, RU); <i>R. Ramesh</i> (Queensl. Univ., AU)	<i>M. Schultz</i> (DLR, DE); <i>A. Mirzoyan</i> (CIAM, RU)	<i>J.-F. Justin</i> (ONERA, FR); <i>A. Shardin</i> (TsAGI, RU)	<i>L. Bussler</i> (DLR, DE); <i>C. Merrem</i> (DLR, DE)
16:00	hisst-2018_640800 Numerical and Experimental Investigation of Air Flow and Heat Transfer in a Complete Circuit of a Hypersonic Wind Tunnel. <i>S. Drozdov, R. Davletkildiev, A. Rtischeva</i> (TsAGI, RU)	hisst-2018_21101120 Modeling of Sonic Boom Phenomena. <i>T. Kiseleva, A. Kosinov, Yu. Ermolaev, V. Volkov</i> (ITAM SB RAS, RU)	hisst-2018_310812 Preliminary Design of a Hooded Fairing Accommodating Winged Payloads. <i>J. Steelant, A. Jasko, J. van den Eynde, M. Appolloni</i> (ESA-ESTEC, NL); <i>J.F.A. Martos</i> (ESA-ESTEC Advanced Studies Inst., BR); <i>A. Kallenbach</i> (DLR, DE); <i>A. Shardin, A. Gorskiy</i> (TsAGI, RU)	hisst-2018_1130816 Assessment of VTVL and VTHL Reusable First Stages. <i>L. Bussler, I. Dietlein, E. Dumont, M. Sippel, S. Stappert, J. Wilken</i> (DLR, DE)
16:30	hisst-2018_41101143 Numerical Investigation of High Temperature CO₂-N₂ Flows in a Plasma Wind Tunnel Facility. <i>A. Pudsey, T. Roos, M. Bricalli, H. Ogawa</i> (RMIT Univ., AU); <i>J. Garcia-Garrido, Ch. Mundt</i> (Inst. for Thermodynamics, Bundeswehr Univ., DE)	hisst-2018_810923 Numerical Simulation Assistant Design of the Near-field Sonic Boom Signature Measurement System for AVIC ARI's FL-60 Wind Tunnel. <i>Qian Zhansen, Leng Yan, Liu Zhongchen</i> (AVIC ARI, CN)	hisst-2018_1911571 Experimental Investigation of Thermo-barrier Coating Based on Zirconium Dioxide. <i>K. Zhirikhin, A. Shardin, S. Kazhichkin, A. Nikulenko, V. Talyzin, E. Dmitriev, A. Sysoev, D. Somov, Yu. Tarasenko</i> (TsAGI, RU)	hisst-2018_1280822 SPACE RIDER: Mission Analysis and Flight Mechanics of the Future European Reusable Space Transportation System. <i>G. De Zaiacomo, D. Bonetti, G. Blanco Arnao, G. Medici</i> (Deimos Space S.L.U., ES)

Monday, November 26				
Hall	Onegin	Chatsky	Pechorin	Chekhov
Topic	PSC-1	A&A-1	PSC-2	A&A-2
17:00	hisst-2018_41801146 Modelling of Heat Transfer in Rocket Combustion Chambers using Eddy-Dissipation Combustion Model. <i>V. Zhukov (DLR, DE)</i>	hisst-2018_2940957 Aerodynamic and Aerothermodynamic Database of the HEXAFLY-INT Hypersonic Glider. <i>A. Schettino, G. Pezzella, M. Marini, S. Di Benedetto (CIRA, IT), V.F. Villace, J. Steelant (ESTEC-ESA, NL), A. Gubanov, N. Voevodenko (TsAGI, RU)</i>	hisst-2018_3180980 Experimental Study of Kerosene Combustion extinguishing and Flame Stability in Supersonic Combustor. <i>Yu. Meng, Hongbin Gu, Jingheng Zhuang, Zhanbiao Gao, Huan Lian, Xinyu Chang (IMEch CAS, CN)</i>	hisst-2018_2930950 Direct Numerical Simulation of Mach Wave and Supersonic Boundary Layer Interaction. <i>I. Egorov (TsAGI, RU), Q. Din, A. Fedorov (MIPT, RU)</i>
17:30	hisst-2018_34401059 Mixing Enhancement of Wall-Injected Fuel in Supersonic Flow by Spark Discharge. <i>A. Firsov, E. Dolgov, R. Rakhimov, M. Shurupov (JIHT RAS, RU), S. Leonov (JIHT RAS, RU; University of Notre Dame, US)</i>	hisst-2018_3250999 Dynamic Effects of MHD Interaction in Hypersonic Flow under Ground-based Experiment Conditions. <i>S. Bychkov, D. Baranov, V. Bityurin, A. Bocharov, V. Grushin, N. Tretyakova (JIHT, RU), N. Batura, N. Kolushov, E. Vasilevsky, N. Zhurkin (TsAGI, RU)</i>	hisst-2018_700868 Research of Flow Control on Supersonic Inlet Diffuser. <i>Jinsheng Zhang, Huacheng Yuan, Yunfei Wang, Guoping Huang (NUA&A, CN)</i>	hisst-2018_2340898 Distinctive Features of Heat Exchange and Laminar-Turbulent Transition in Hypersonic Boundary Layers on Flat Blunted Bodies. <i>V. Shalaev, M. Starodubtsev (MIPT, RU), S. Alexandrov, A. Vaganov (TsAGI, RU)</i>

Monday, November 26					
Hall	Bunin	Gogol	Dostoevsky	Turgenev	Hall
Topic	T&E-1	O&S-1	M&S-1	M&V-1	Topic
17:00	hisst-2018_1330906 Capability of the X2 Expansion Tube to Generate a High Enthalpy, High Reynolds Number Test Flow. <i>R. Ramesh, R. Morgan, D. Mee (Queensland Univ., AU)</i>	hisst-2018_43401176 Noise Reduction using Optimal Takeoff Thrust Management for Supersonic Business Jet. <i>A. Mirzoyan (CIAM, RU)</i>	hisst-2018_1760854 Structural Topology Optimisation of the HEXAFLY-INT Vertical Fin. <i>D.J. Munk, G.A. Vio, D. Verstraete (Sydney Univ., AU); J. Steelant, V.F. Villace (ESA-ESTEC, NL)</i>	hisst-2018_1870857 Preliminary Aerodynamic Design of a Reusable Booster Flight Experiment. <i>C. Merrem, V. Wartemann, Th. Eggers (DLR, DE)</i>	17:00
17:30	hisst-2018_1710851 Development of the Technique of Sonic Boom Experimental Researches. <i>T. Pritulo, S. Chernyshev, A. Ivanov, A. Kiselev, V. Mosharov, D. Sboev, L. Teperin, V. Yudin (TsAGI, RU)</i>	hisst-2018_24701065 HyCost: A Life Cycle Cost Estimation Tool for Hypersonic Transportation System. <i>R. Fusaro, V. Vercella, D. Ferretto, N. Viola (Politecnico di Torino, IT); V.F. Villace, J. Steelant (ESA-ESTEC, NL)</i>	hisst-2018_28601101 Ultra-High Temperature Ceramics: Developments for Hypersonic Applications. <i>J.-F. Justin, A. Julian-Jankowiak, V. Guérineau, V. Mathivet (ONERA, Univ. Paris-Saclay, FR)</i>	hisst-2018_1280821 EXOMARS 2020 Entry Descent and Landing Mission Analysis Verification. <i>G. De Zaiacomo, D. Bonetti, I. Pontijas Fuentes, G. Blanco Arnao (Deimos Space S.L.U., ES); F. Calantropio (Thales Alenia Space, IT); L. Lorenzoni (ESA, NL)</i>	17:30



Tuesday, November 27				
08:30	Speaker's Briefing (<i>Vrubel foyer</i>)			
09:00	Plenary 2 (<i>Vrubel hall</i>)		Session Chair: <i>Johan Steelant</i> (ESA-ESTEC, Netherlands)	
09:30	TsAGI's 100th Anniversary: History, People, Outstanding Events. <i>Gennady Amiryants</i> (TsAGI, Russia)			
Hall	<i>Vrubel</i>	<i>Onegin</i>	<i>Pechorin</i>	<i>Chekhov</i>
Topic	A&A-3	PSC-3	PSC-4	A&A-4
Chair	<i>I. Egorov</i> (TsAGI, RU); <i>V. Kopeiev</i> (TsAGI, RU)	<i>V. Talyzin</i> (TsAGI, RU); <i>Fang Chen</i> (Shanghai Jiao Tong Univ., CN)	<i>V. Vlasenko</i> (TsAGI, RU); <i>S. Karl</i> (DLR, DE)	<i>A. Gubanov</i> (TsAGI, RU); <i>I. Amelyushkin</i> (TsAGI, RU)
10:00	hisst-2018_2760930 Study on 3D Lattice Boltzmann Method for High-Speed Viscous Flows. <i>Ruofan Qiu, Yancheng You, Rongqian Chen, Chenxiang Zhu, Jianfeng Zhu</i> (Xiamen University, CN)	hisst-2018_1750850 Hysteresis Phenomenon of Shock Train in an Isolator with Incident Shocks. <i>Nan Li, Juntao Chang, Kejing Xu, Wen Bao, Daren Yu</i> (ESEAFIS, CN)	hisst-2018_1640846 Post-test Analysis of the LAPCAT-II Subscale Scramjet. <i>S. Karl, J. Martinez, K. Hannemann</i> (DLR, DE)	hisst-2018_19601030 Amplitude Method of Laminar-Turbulent Transition Prediction in Three-dimensional Supersonic Boundary Layer at Swept Wing. <i>M. Ustinov</i> (TsAGI, RU)
10:30	hisst-2018_43301174 Effect of Reacting Flow on Flutter at Hypersonic Flight Speed. <i>V. Vedeneev</i> (Lomonosov MSU, RU); <i>V. Nesterov</i> (MAI, RU); <i>A. Medvedskii, K. Sypalo</i> (TsAGI, RU)	hisst-2018_42101147 Control of Flow Parameters in the Model of the Pre-chamber Isolator for Ramjet Engine. <i>D. Lapinsky, N. Guryleva, M. Ivankin, A. Tereshin</i> (TsAGI, RU)	hisst-2018_3000970 Comparison of Air-Breathing Jet Engines with Deflagration and Detonation Combustion. <i>A. Kraiko, A. Egoryan</i> (CIAM, RU)	hisst-2018_70810 Estimation of Laminar-to-turbulent Transition using Empirical and Numerical Methods for Various Aerodynamic Forms. <i>N. Voevodenko, A. Gubanov, D. Ivanyushkin, Yu. Shvalev</i> (TsAGI, RU)
11:00	hisst-2018_2030871 Analysis of Hypersonic Model Pitching Experiments in the TUSQ Facility. <i>N. Stern, D.R. Buttsworth, R. Choudhury, B. Reimann</i> (S. Queensl Univ., AU)	hisst-2018_1701070 Investigation on the Streamline-traced Intake Starting. <i>V. Talyzin, A. Fedorov, A. Gubanov, M. Ivankin</i> (TsAGI, RU)	hisst-2018_2240912 Hypersonic Hydrocarbon Fuel Vehicle with M = 6+. <i>A. Kuranov, A. Korabelnikov</i> (HSRE, RU); <i>V. Abashev</i> (MAI, RU); <i>P. Tretyakov</i> (ITAM SB RAS, RU)	hisst-2018_1880875 Influence of Active Cooling on Second Mode Instabilities Investigated on Hypersonic, Conical Flows. <i>V. Wartemann, P. Reiter, A. Wagner, G. Ponchio Camillo</i> (DLR, DE)
11:30	Coffee Break			

Tuesday, November 27				
08:30				
09:00				
09:30				
Hall	<i>Bunin</i>	<i>Gogol</i>	<i>Dostoevsky</i>	<i>Turgenev</i>
Topic	T&E-2	G&C-1	HFH-1	TEM-1
Chair	<i>P.M. Seltner</i> (DLR, DE); <i>A. Rudinskii</i> (CIAM, RU)	<i>S. Takovitskii</i> (TsAGI, RU); <i>O. Janova</i> (TsAGI, RU)	<i>I. Lipatov</i> (TsAGI, RU); <i>J.-Y. Andro</i> (ONERA, FR)	<i>H. Böhrk</i> (DLR, DE); <i>V.F. Villace</i> (ESA-ESTEC, NL)
10:00	hisst-2018_31001139 Experimental Determination of Aerodynamic Coefficients of Simple-shaped Bodies Free-flying in Hypersonic Flow. <i>P.M. Seltner, S. Willems, A. Guelhan</i> (DLR, DE)	hisst-2018_1130819 Optimized Reentry Trajectories for Winged RLV Stages. <i>L. Bussler</i> (DLR, DE)	hisst-2018_1200959 Asymptotic Analysis of Steady Secondary Flow in a Turbulent Boundary Layer. <i>V. Zametaev, A. Gorbushin</i> (TsAGI, RU)	hisst-2018_15701098 Experimental and Numerical Achievements in High Temperature Management for Hypersonic Flight. <i>H. Böhrk, T. Stäbler, Ch. Dittert, I. Sakraker, D. Prokein</i> (DLR, DE)
10:30	hisst-2018_550801 Aerodynamic Characterization of a Hooded Fairing Accommodating Winged Payloads. <i>J. F.A. Martos, J. Steelant</i> (ESTEC-ESA, NL); <i>R. O. Santos, M. A. S. Minucci, I. S. Rego</i> (IAS, Brazil)	hisst-2018_1580867 Bringing Highly Efficient RLV-Return Mode "In-Air-Capturing" to Reality. <i>M. Sippel, L. Bussler, S. Krause, S. Cain</i> (DLR, DE)	hisst-2018_47601548 Starting and Heating of Rectangular Hypersonic Inlet with Blunted Leading Edges. <i>V. Borovoy, V. Mosharov, A. Skuratov, V. Radchenko</i> (TsAGI, RU)	hisst-2018_1770921 Thermal Management of the HEXAFly-INT Hypersonic Glider. <i>J.-Y. Andro</i> (ONERA, FR); <i>R. Scigliano</i> (CIRA, IT); <i>A. Kallenbach</i> (DLR, DE); <i>J. Steelant</i> (ESA-ESTEC, NL)
11:00	hisst-2018_40101127 Dynamic Characteristics of the Working Process in Vitiated Heaters of High-enthalpy Test Rigs. <i>N. Kukshinov, V. Aleksandrov, M. Ilchenko</i> (CIAM, RU)	hisst-2018_1280824 Space Rider: Entry and Taem GNC of the Future European Reusable Space Transportation System. <i>G. De Zaiacomo, C. Recupero, A. Pagano, M. Kerr, P. Rosa, R. Haya-Ramos</i> (Deimos Space S.L.U., ES)	hisst-2018_34501037 Numerical Study of Wave Trains in High-speed Boundary Layer over a Cone. <i>A. Novikov</i> (TsAGI, RU)	hisst-2018_24701056 Preliminary Design and Sizing of the Thermal and Energy Management Subsystem for LAPCAT MR2. <i>R. Fusaro, D. Ferretto, V. Vercella, N. Viola</i> (Politecnico di Torino, IT); <i>V. F. Villace, J. Steelant</i> (ESA-ESTEC, NL)
11:30				

Tuesday, November 27				
Hall	Vrubel	Onegin	Pechorin	Chekhov
Topic	A&A-3	PSC-3	PSC-4	A&A-4
12:00	hisst-2018_13401004 Method for Solving the Equations Describing the Interaction of a 3-D Boundary Layer with an Outer Inviscid Supersonic Flow. <i>G. Korolev (TsAGI, RU)</i>	hisst-2018_39101097 Investigation of the Features of the Flow Structure in a Multi-channel Supersonic Air Intake Device. <i>D. Rakhmanin, A. Trifonov (TsAGI, RU)</i>	hisst-2018_43401175 Possible Unification of Engines for Advanced Small and Medium Supersonic Civil Aeroplanes. <i>A. Mirzoyan, A. Evstigneev (CIAM, RU)</i>	hisst-2018_1100813 Micro-aerothermodynamic Analysis of Protuberances and Clearances on a Hypersonic Glider Using a Reduced Domain Approach. <i>R. Choudhury, V.F. Villace, J. Steelant (ESTEC-ESA, NL); D. Buttsworth (S. Queensl. Univ., AU)</i>
12:30	hisst-2018_1070895 Generation of Three-Dimensional Disturbances in a Boundary Layer on Strong Interaction. <i>G. Dudin, V. Neyland (TsAGI, RU)</i>	hisst-2018_2650917 Unsteady Simulation of the Flow in a Hypersonic Airbreathing Vehicle Air Intake during Cowl Opening using a Conservative Overlapping Mesh CFD Technique. <i>M. Ferrier, P. Grenard (ONERA, FR)</i>	hisst-2018_27401035 Air-breathing Electric Propulsion for Long-term Flights in Very Low Earth Orbits. <i>A. Filatyev, A. Erofeev, A. Nikiforov, O. Yanova (TsAGI, RU); G. Popov, S. Khartov (MAI, RU)</i>	hisst-2018_960884 Experimental Investigation of Rarefaction Effects on Aerodynamic Coefficients of Slender and Blunt Re-entry Vehicles. <i>T. Schlegat, K. Hannemann (DLR, DE)</i>
13:00	hisst-2018_910807 Acoustic Diagnostics of Instability Waves in Supersonic Jet. <i>V. Kopiev, M. Zaytsev, S. Chernyshev (TsAGI, RU)</i>	hisst-2018_35801117 Numerical Investigation of Total Pressure Pulsations in Supersonic Trapezoidal Air Intake using Eddy Resolving DES Method. <i>E. Novogorodtsev (TsAGI, RU)</i>	hisst-2018_41601152 Design and Numerical Simulation of a Common Nozzle of Multi-channel TBCC Engine. <i>Rongqian Chen, Yangcan Huang, Chengxiang Zhu, Ruofan Qiu, Yancheng You (Xiamen Univ., CN)</i>	hisst-2018_510879 Numerical and Experimental Analysis of Rarefaction Effects on Aerodynamic Coefficients of a Slender Re-entry Vehicle. <i>K. Hannemann, C. Hepp, T. Schlegat, M. Grabe (DLR, DE)</i>
13:30	Lunch			
14:30	Technical Tours			
...				
18:00				

Tuesday, November 27				
Hall	Bunin	Gogol	Dostoevsky	Turgenev
Topic	T&E-2	G&C-1	HFH-1	TEM-1
12:00	hisst-2018_39901110 Calculated-experimental Investigation of the Flow in The Gasdynamic Throttle. <i>V. Zakharov, A. Rudinskii, S. Gusev (CIAM, RU)</i>	hisst-2018_38001112 Aircraft Actuating System Fault Diagnosis under Complete Uncertainty. <i>E. Zybin, V. Kosyanchuk, S. Karpenko (GosNIIAS, RU)</i>	hisst-2018_1300827 Compressibility and Temperature Effects on Turbulent Spot Growth. <i>J. Van den Eynde, J. Steelant (ESA, NL)</i>	hisst-2018_3130978 Numerical Solution of the Problem of Flow and Heat Exchange in Model Chambers of Combustion of High-speed Direct Air-reactor Engines on Hydrogen Fuel. <i>M. Frantsuzov, O. Serpinsky (CIAM, RU)</i>
12:30	hisst-2018_2260890 Converging-Diverging Nozzles with Constant-radius Centerbody. <i>A.K. Flock, A. Gülhan (DLR, DE)</i>	hisst-2018_1770922 Design of the Actuation System of the HEXAFly-INT Hypersonic Glider. <i>J.-Y. Andro (ONERA, FR); F. Nebula (CIRA, IT); W. Rotärmel (DLR, DE); J. Steelant (ESA-ESTEC, NL)</i>	hisst-2018_11401090 New Kinetic Models in Non-equilibrium Aerodynamic Problems. <i>E. Kustova, E. Nagnibeda (SPbSU, RU)</i>	hisst-2018_40701135 Velocity Fluctuations Effect on an Air-methane Flame Blow-off at Low Damkohler Numbers. <i>K. Arefyev, A. Krikunova, V. Panov, K. Fedotova (CIAM, RU)</i>
13:00	hisst-2018_640799 Experimental Investigation of Aero-Thermodynamic Characteristics of "ExoMars" Descent Module at Hypersonic Velocities. <i>S. Drozdov, V. Brazhko, R. Davletkildiev, D. Fyodorov, I. Shemetov (TsAGI, RU)</i>	hisst-2018_11201006 Optimum Trim of an Experimental Hypersonic Glider. <i>V.F. Villace (ESA, NL); S. Takovitskii (TsAGI, RU)</i>	hisst-2018_9001039 Thermal Protection of the Surface of a High-Speed Aircraft from Convective Heat Flow by Gas Blowing. <i>E. Vasilevsky, I. Ezhov, P. Chuvakhov (TsAGI, RU)</i>	
13:30				
14:30				
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18:00				

Wednesday, November 28				
08:30	Speaker's Briefing (<i>Vrubel foyer</i>)			
09:00	Plenary 3 (<i>Vrubel hall</i>)		Session Chair: <i>Yung-Hwan Byun</i> (Konkuk University, South-Korea)	
09:30	The experience of Construction of the Tu-144. Use the Experience in Developing a Supersonic Business Jet (SBJ). <i>Alexander Konyuchov</i> (Tupolev DB, Russia)			
Hall	<i>Vrubel</i>	<i>Onegin</i>	<i>Pechorin</i>	<i>Chekhov</i>
Topic	A&A-5	PSC-5	PSC-6	A&A-6
Chair	<i>N. Voevodenko</i> (TsAGI, RU); <i>A. Obraz</i> (TsAGI, RU)	<i>V. Zhukov</i> (ISP DLR, DE); <i>J.-Y. Choi</i> (PNU, KR)	<i>C. Bauer</i> (MBDA, DE); <i>Pan Hongliang</i> (NPU, CN)	<i>C. Stemmer</i> (Muenich TU, DE); <i>G. Dudin</i> (TsAGI, RU)
10:00	hisst-2018_31501116 Effects of Injection on the Boundary Layer Stability over a Blunt Body. <i>A. Obraz, A. Fedorov</i> (MIPT, RU); <i>N. Palchekovskaya, I. Egorov</i> (TsAGI, RU)	hisst-2018_34401060 Reduction of Power Consumption for Quasi-DC Discharge Applied for Combustion Control in Supersonic Airflow. <i>A. Firsov, E. Dolgov, R. Rakhimov</i> (JIHT RAS, RU); <i>S. Leonov</i> (JIHT RAS, RU); <i>Notre Dame Univ., US</i>	hisst-2018_42801161 SABRE Bypass Ramjet Concept Evaluation. <i>C. Bauer, R. Baumann, G. Kurth, R. Schlaps, Ph. Störchle</i> (MBDA-Systems, DE)	hisst-2018_870841 Application of RANS/LES Hybrid Method in Simulation of Supersonic Base Flow. <i>Fu Weijia, Ma Jingzhong, Li Jie</i> (AVIC Hongdu, NPU, CN)
10:30	hisst-2018_2890979 Mathematical Simulation, Numerical and Experimental Investigation of Nonspherical Bodies' Motion in Nonuniform Flows. <i>I. Amelyushkin</i> (TsAGI, RU)	hisst-2018_47001212 Development of the Basis Naphthene Oxidation Kinetic Model for Simulation of the Practical Fuel Combustion. <i>M. Abbasi</i> (DLR, DE); <i>N. A. Slavinskaya</i> (GRS, DE)	hisst-2018_920852 Three-dimensional Bump Design for Improving the Starting Characteristics of Hypersonic Inlets. <i>Xiaogang Zheng, Yiqing Li, Yancheng You</i> (Xiamen Univ., CN)	hisst-2018_1950863 Roughness-induced Instabilities Leading to Transition in a Capsule Boundary-layer under Re-entry Conditions. <i>C. Stemmer, A. Di Giovanni</i> (Muenich TU, DE)
11:00	hisst-2018_1810855 Interaction of a Solid Body with a Multiphase Supersonic Flow: Physico-Mathematical Models and Numerical Investigations. <i>G. Molleson, A. Stasenko</i> (TsAGI, RU)	hisst-2018_33601050 Regimes of Turbulent Supersonic Combustion depending on Fuel Temperature. <i>Jeong-Yeol Choi, Hye-Sung Kim</i> (PNU, KO)	hisst-2018_2400903 Flow Visualization and Control of Unstarting Scramjet Inlet-isolator. <i>Kyungrae Kang, Jong Ho Choi, Seong-kyun Im, Seung Jin Song, Hyungrok Do</i> (Seoul NU, KO)	hisst-2018_1020853 Application of a Reference Plane Method Calculating Flowfield behind Three-dimensional Elliptic Conical Shock Wave. <i>Shi Chong-guang, Zhu Cheng-xiang, You Yan-cheng</i> (Xiamen Univ., CN)
11:30	<i>Coffee Break</i>			

Wednesday, November 28					
08:30					
09:00					
09:30					
Hall	<i>Bunin</i>	<i>Gogol</i>	<i>Dostoevsky</i>	<i>Turgenev</i>	Hall
Topic	T&E-4	G&C-2	T&E-3	M&V-2	Topic
Chair	<i>J. M. Schramm</i> (DLR, DE); <i>N. Kukshinov</i> (CIAM, RU)	<i>A. Fylatiev</i> (TsAGI, RU); <i>Tao Chao</i> (HIT, CN)	<i>F. Hufgard</i> (Stuttgart Univ., DE); <i>A. Volkova</i> (TsAGI, RU)	<i>S. Di Benedetto</i> (CIRA, IT); <i>M. Sippel</i> (DLR, DE)	Chair
10:00	hisst-2018_31201165 Hypersonic Characterisation of Rarefied Flow Generated in the Oxford Low Density Wind Tunnel. <i>N. L. Donaldson, C. F. Wilson, P. T. Ireland</i> (Oxford Univ., UK)	hisst-2018_1630843 Development of High Speed Flying Vehicle on-Board Integrated Navigation, Control and Guidance System. <i>M. Krasilshchikov</i> (MAI, RU); <i>K. Sypalo</i> (TsAGI, RU)	hisst-2018_720804 Mixing Characteristics in a Hypersonic Flow around a Transpiration Cooled Flat Plate Model. <i>T. Hermann, M. McGilvray, H.S. Ifti</i> (Oxford Univ., UK)	hisst-2018_3101064 Flight Testing Designs in HEXAFly-INT for High-speed Transportation. <i>J. Steelant, HXI-team</i> (ESA-ESTEC, NL)	10:00
10:30	hisst-2018_40101126 Investigation of Dynamic Characteristics of HEXAFly-INT Facility Module in High-altitude Testing Conditions. <i>N. Kukshinov, V. Aleksandrov, K. Arefyev, M. Ilchenko</i> (CIAM, RU)	hisst-2018_1860856 Trajectory and Flight Mechanics Analysis of the HEXAFly-INT Experimental Flight Vehicle. <i>G. Morani, F. Nebula, S. Di Benedetto, M. P. Di Donato</i> (CIRA, IT); <i>J. Steelant</i> (ESA-ESTEC, NL)	hisst-2018_2330896 Analysis of Porous Materials for Transpiration-cooled Heat Flux Sensor Development. <i>F. Hufgard, S. Löhle, J. von Wolfersdorf</i> (Stuttgart Univ., DE); <i>J. Steelant</i> (ESA-ESTEC, NL)	hisst-2018_42601154 Multidisciplinary Design and Flight Test of the HEXAFly-INT Experimental Flight Vehicle. <i>S. Di Benedetto, M. P. Di Donato, A. Rispoli, G. Pezzella, R. Scigliano, F. Nebula, D. Cristillo, L. Vecchione</i> (CIRA, IT); <i>S. Cardone</i> (TET, IT); <i>J. Steelant, V. Villace</i> (ESA-ESTEC, NL)	10:30
11:00	hisst-2018_2190880 Ultra-fast Temperature Sensitive Paint Shock Tunnel Heat Flux Measurements on the Intake of the LAPCAT II Small Scale Flight Experiment Configuration. <i>J. M. Schramm, S. Karl, K. Hannemann</i> (DLR, DE); <i>H. Ozawa</i> (TMU, JP)	hisst-2018_37001100 Optimal Climbing Trajectories of Hypersonic Aircraft based on Direct Methods of Flight Dynamics. <i>A. Chekin, M. Kiselev, Ya. Moroshkin</i> (GosNIIAS, RU)	hisst-2018_36801066 Experimental Investigation on Flight Test Vehicle Aerodynamics at TsAGI T-116 Wind Tunnel: Powered and Glider Options. <i>A. Gubanov, D. Gusev, V. Yakovleva</i> (TsAGI, RU)	hisst-2018_940809 Design of Gravity-assist Trajectories for Thrust Pinch in an Integrated Aircraft-propulsion System. <i>Jialin Zheng, Juntao Chang, Daren Yu</i> (School of ESE, CN)	11:00
11:30					11:30

Wednesday, November 28				
Hall	Vrubel	Oegin	Pechorin	Chekhov
Topic	A&A-5	PSC-5	PSC-6	A&A-6
12:00	hisst-2018_1300826 Intermittency-based Transition Model with Local Empirical Correlations. <i>J. Van den Eynde, J. Steelant</i> (ESA, NL)	hisst-2018_2380909 Application of Dynamic Adaptive Chemistry and in Situ Adaptive Tabulation for Computationally Efficient Modeling of Supersonic Turbulent Combustion. <i>Jian An, Guoqiang He, Fei Qin, Xianggeng Wei, Duo Zhang</i> (NPU, CN)	hisst-2018_2870951 Comprehensive Effects of Secondary Heat Release on Ejection and Engine Performance in RBCC Ejector Mode. <i>Pan Hongliang, Ye Jinying</i> (NPU, CN); <i>Lin Binbin</i> (NPU, CAFU of China, CN)	hisst-2018_690803 Numerical Simulation of Two Shear Layers Interaction in Double Backward-facing Steps. <i>Deng Fang, Han Guilai</i> (IMech CAS, CN)
12:30	hisst-2018_1440832 Numerical Studies of Receptivity of a Supersonic Boundary Layer to Solid Particulates. <i>P. Chuvakhov, A. Fedorov</i> (TsAGI, RU)	hisst-2018_40401144 Effect of Fuel Composition and Post-combustion Chamber length on Combustion Performance of Paraffin-based Hybrid Rocket Motor. <i>Yi Wu, Zezhong Wang, Xilong Yu, Xin Lin, Fei Li</i> (IMech CAS, CN)	hisst-2018_28701121 Study on Ma2-7 Variable Geometry RBCC Performance Via Full Flow Path Simulations. <i>Pan Hongliang, Ye Jinying, Qin Fei, Wang Yajun</i> (NPU, CN)	hisst-2018_2810952 Detailed Mathematical and Numerical Investigations of Shock Wave — Boundary Layer Interaction in Hypersonic Flows. <i>S. Danaila, D. Isvoranu, C. Levențiu, A. Bogoi</i> (PU Bucharest, RO)
13:00	hisst-2018_880908 Numerical Simulation of Mass Addition Effect on Heat Transfer of Descent Space Vehicle. <i>N. Palchekovskaya, I. Egorov</i> (TsAGI, RU)		hisst-2018_1690847 Numerical Study of Embedded Rocket on Back Pressure Resistance of an RBCC Inlet. <i>Lei Shi, Haijian Lou, Da Gao, Shuaizhong Wang, Fei Qin, Guoqiang He</i> (NPU, CN)	hisst-2018_13901077 Influence of Free Stream Inhomogeneity on Heat Flux and Temperature on a Plate in a Supersonic Flow. <i>G. Nikiforov</i> (SPbSU, RU)
13:30	Lunch			
14:30	Plenary 4 (Vrubel hall) Session Chair: <i>Lihong Chen</i> (Chinese Academy of Sciences, China)			
15:00	Value of Speed — Different Perspectives and Challenges. <i>Volker Gollnick</i> (Institute of Air Transportation Systems, DLR, Germany)			
15:30	Coffee Break			

Wednesday, November 28				
Hall	Bunin	Gogol	Dostoevsky	Turgenev
Topic	T&E-4	G&C-2	T&E-3	M&V-2
12:00	hisst-2018_38401106 Temperature Measurements in a Carbon Dioxide Flow using Laser-induced Fluorescence. <i>T. Sander, M. Kirschner, Ch. Mundt</i> (Bundeswehr Univ. Muenich, DE); <i>A. S. Pudsey</i> (RMIT University, AU)	hisst-2018_1800991 Differential Flatness-based Finite Time Sliding Mode Control of Hypersonic Vehicle. <i>W. Yuxiao, Tao Chao, Songyan Wang, Ming Yang</i> (HIT, CN)	hisst-2018_2650953 Scramjet Testing Methodology with Vitiated Air. <i>M. Ferrier, D. Scherrer</i> (ONERA, FR)	hisst-2018_1580839 Technical Progress of Multiple-mission Reusable Launch Vehicle SpaceLiner. <i>M. Sippel, S. Stappert, L. Bussler, S. Forbes-Spyratos</i> (DLR, DE)
12:30	hisst-2018_38601093 Investigation of Nonequilibrium Heat Exchange and Catalytic Properties. <i>B. Zhestkov, A. Vaganov, I. Senyuev, V. Shtapov, M. Tselunov</i> (TsAGI, RU); <i>I. Sakharov</i> (IMech MSU, RU)		hisst-2018_43001166 Methods of the Wall Interference Reduction at Low Supersonic Velocities in the Wind Tunnel. <i>A. Volkova, S. Chernyshev, A. Ivanov, E. Streltsov</i> (TsAGI, RU)	hisst-2018_1900861 Reusable Aerospace System of Horizontal Takeoff for Orbital Injection and Intercontinental Flight. <i>S. Mikhalyov, V. Buzuluk</i> (TsAGI, RU)
13:00				hisst-2018_36401055 Hyplane: Sub-orbital Easy and Common Access. <i>G. Russo, R. Savino, D. Pisanti, M. Saviano, F. Perrelli</i> (CNS, IT)
13:30				
14:30				
15:00				
15:30				

Wednesday, November 28				
Hall	Vrubel	Onegin	Pechorin	Chekhov
Topic	A&A-7	PSC-7	PSC-8	A&A-8
Chair	Ji Chen (CAAA, CN); Y. Dobrov (SPbSU, RU)	I. Manuylovich (TsAGI, RU); Yue Huang (Xiamen Univ., CN)	Ke Dai (Xiamen Univ., CN); Wang Jianlei (NPU, CN)	B. Reimann (DLR, DE); P. Polivanov (ITAM SB RAS, RU)
16:00	hisst-2018_1970864 Aerodynamic Damping and Buffet Response Test of an Aeroelastic Launch Vehicle Model in Transonic Flow. Ji Chen (CAAA, CN)	hisst-2018_33801021 Effect of Direct-reverse Successive Changes of Equivalence Ratios on Transient Combustion in a Scramjet Combustor. Yue Huang, Binyi Shenwu, Zhenye Luan, Fei Xing, Yancheng You (Xiamen Univ., CN)	hisst-2018_3010983 Experiments on Liquid Kerosene Ignition in a Supersonic Combustor with Various Ignition Assistance Methods. Inyoung Yang, Kyungjae Lee, Sanghun Lee, Yangji Lee (KARI, KO)	hisst-2018_38101091 Simulation of Support Module Separation in a Hypersonic Flight Experiment. B. Reimann (DLR, DE)
16:30	hisst-2018_460802 High Credible Simulation and Validation of Turbulence Models Effects on a Low-aspect-ratio Flying-wing Model. Li Qing (CAE, CN)	hisst-2018_390987 Numerical Investigation on A Free-jet Staged-Combustion Dual-mode Scramjet Combustor. Fang Chen, Di Lu (Shanghai Jiao Tong University, CN)	hisst-2018_15101002 Active Flow Control of Wide-envelope Air-breathing Engine Inlet. Wang Jianlei, Li Tiangang, Wei Zhen, Chen Bing, Gong Chunlin, Gu Liangxian (NPU, CN)	hisst-2018_1480920 Effect of Roughness of Bluntness Nose on the Laminar-turbulent Transition at High Mach Numbers. P. Polivanov, Yu. Gromyko, D. Bountin, A. Maslov (ITAM SB RAS, RU)
17:00	hisst-2018_2130878 Nonlinear Flutter of Curved Composite Panels in High Speed Flow. An Xiaomin (NPU, CN)	hisst-2018_37901081 Characteristics on Combustion Mode in Dual Mode Scramjet Engine. Hyuck-Joon Namkoug (Hyundai Rotem Company, KO)	hisst-2018_1780869 Micro Cavity Control for Buzz Suppression in Supersonic Inlet. Ke Dai, Jian Teng, Xiao-Gang Zheng, Ian-Feng Zhu, Yan-Cheng You (Xiamen University, CN)	hisst-2018_41001129 Influence of Angle of Attack on Hypersonic Wake Flow Structure of a Sharp Cone. Zhi Chen, Liang Zhang, Qingqing Zhang (CAAA, CN)
17:30	hisst-2018_13701094 Study of Effects from Local Energy Deposition in Supersonic Gas Flow on Well-streamlined Body. Y. Dobrov, V. Lashkov, I. Mashek, R. Khoronzhuk (SPbSU, RU)	hisst-2018_2160876 Pulsation Frequency Management of Thrust Force and Gas Pressure in Nozzles. A. Khmelevsky, I. Manuylovich (IMech MSU; TsAGI, RU), V. Levin (IMech MSU; TsAGI; IACP FEB RAS, RU); N. Afonina, V. Gromov (IMech MSU, RU); V. Markov (IMech MSU; TsAGI; V.A. Steklov Math. Inst., RU)	hisst-2018_58201625 The High-Speed Cruise Ramjet Hydrogen Demonstrator for Hypersonic Flight Velocities. E. Son (MIPT; JIHT RAS, RU); V. Degtyar, V. Khlybov (FRC by Makeev, RU); A. Prokhorov, K. Arefiev, V. Alexandrov, O. Guskov (MIPT; CIAM, RU); S. Kalashnikov (FRC by Makeev, RU); R. Sidorov (CIAM, RU); K. Son (MIPT, RU)	hisst-2018_2010873 Drag Reduction of Hypersonic Spiked Blunt Body with Sideward Jets. Guilai Han, Zonglin Jiang (IMech CAS, CN)

Wednesday, November 28				
Bunin	Gogol	Dostoevsky		Hall
T&E-6	HFH-2	T&E-5		Topic
J.A. Myrick (Tennessee Univ., US); Lin Jian (CAAA, CN)	R. P. H. Berton (ONERA, FR); A. Kosinov (ITAM RAS, RU)	V. Lebiga (ITAM SB RAS, RU); Chun-lin Gong (NPU, CN)		Chair
hisst-2018_24501049 Thin Film Heat Transfer Research and Development at CAAA Impulse Tunnel. Lin Jian, Chen Xing, Wang Dan (CAAA, CN)	hisst-2018_660805 Analytic Model of a Resistive Magneto-hydrodynamic Shock. R. P. H. Berton (ONERA, FR)	hisst-2018_41701142 The Wind Tunnel Test Method of Airframe-propulsion Integration for Rocket-based Combined Cycle Launch Vehicle. Chun-lin Gong, Bing Chen, Jian-lei Wang, Tian-gang Li, Liang-xian Gu, Shuo Tang (NPU, CN)		16:00
hisst-2018_2220894 Study on Sapphire Fiber Optic Sensor for High Temperature. Jingbo Yu, Guojian Kang, Wei Wang, Bo Zhao, Zhan Huang, Xuejun Zhao (CAAA, CN)	hisst-2018_47801549 Interaction of Oblique Shock Wave with the Bow Wave in the Presence of Underlying Plate. V. Borovoy, V. Mosharov, V. Radchenko, A. Skuratov (TsAGI, RU)	hisst-2018_41501173 Sources and Structure of Fluctuations in High Speed Wind Tunnels. V. Lebiga, V. Zinovyev, A. Pak, A. Ivanov, A. Gorbushin (ITAM SB RAS; TsAGI, RU)		16:30
hisst-2018_1720965 Calibration of a Plate Sensor for Total Heat Transfer into a Surface with a Spatially and Time Varying Heat Flux. J.A. Myrick, M. Keyhani, J. I. Frankel (Tennessee Univ., US); M. Bouchez, F. Falempintt (MBDA, FR)	hisst-2018_12301201 Experimental Study of Origin of Turbulence and Laminar-turbulent Transition in Inhomogeneous Supersonic Boundary Layers. A. Kosinov (ITAM SB RAS, RU)	hisst-2018_22901047 An Energy-saving Aerodynamic Layout for Large-scale Conventional Hypersonic Wind Tunnel. Tiejun Wang (IWTE, CN)		17:00
	hisst-2018_17401155 On Effective Implementation of Block LU-SGS Scheme on Hybrid Unstructured Grid for Hypersonic Flow. X. Li, X. Wang, Z. Shi, Y. Zhang (Institute of Mechanics, CN)	hisst-2018_2610913 Three-dimensional Measurements on a Supersonic Jet Flame Based on Tomographic Chemiluminescence. Qingchun Lei, Bing Liu, Yeqing Chi, Jiawei Zheng, Yibin Xia, Wei Fan (NPU, CN)		17:30

Thursday, November 29				
08:30	Speaker's Briefing (<i>Vrubel foyer</i>)			
09:00	Plenary 5 (<i>Vrubel hall</i>) Session Chair: <i>Sergey Chernyshev</i> (TsAGI, Russia)			
09:30	Sonic Boom Problem: Past, Present and Future. <i>Vladimir Fomin, Tatiana Kiseleva, Iadislav Volkov</i> (ITAM SB RAS, Russia), <i>Sergey Chernyshev</i> (TsAGI, Russia)			
Hall	<i>Vrubel</i>	<i>Onegin</i>	<i>Pechorin</i>	<i>Bunin</i>
Topic	HFH-3	PSC-9	T&E-7	M&V-3
Chair	<i>M. Ustinov</i> (TsAGI, RU); <i>Bing Chen</i> (NPU, CN)	<i>V. Markov</i> (IMech MSU, RU); <i>Lingfeng Wang</i> (BATI, CN)	<i>A. Gorbushin</i> (TsAGI, RU); <i>T. Bykerk</i> (Sydney Univ., AU)	<i>A. Pavlenko</i> (TsAGI, RU); <i>G. De Zaiacomo</i> (Deimos Space S.L.U., ES)
10:00	hisst-2018_32101141 The Nonlinear Multi-Physics Coupling of Airframe-propulsion Integration for the Air-breathing Launch Vehicle. <i>Bing Chen, Chun-lin Gong, Jian-jun Gou, Dan Chen, Liang-xian Gu</i> (NPU, CN)	hisst-2018_9801058 Study of Detonation Waves by Means of Mathematical Modeling. <i>V. Levin, I. Manuylovich, V. Markov</i> (MSU, IMech MSU, RU)	hisst-2018_46401203 Aerodynamic Characteristics of Generic Test Models under High-Temperature Real-gas Condition in Free-Piston Shock Tunnel HIEST. <i>H. Tanno, T. Komuro, K. Sato, K. Itoh</i> (JAXA; KSC; Kakuda Miyagi, JP)	hisst-2018_600969 Combined Approach to Aerodynamic Shape Optimization. <i>N. Ageev, A. Pavlenko</i> (TsAGI; MIPT, RU)
10:30	hisst-2018_36501072 Parametric Investigation of the Front Section of an Aircraft for Optical Purposes. <i>M. Ledyankin, A. Batrakov, S. Mikhaylov</i> (KAI, RU)	hisst-2018_33401015 Stabilization and Control of Detonation in Supersonic Gas Flow in Plane Channel. <i>T. Zhuravskaya</i> (IMech MSU; TsAGI, RU); <i>V. Levin</i> (IMech MSU; TsAGI; ACPI FEB RAS, RU)	hisst-2018_43801200 Current Status of the DLR Reusability Flight Experiment — ReFEx. <i>P. Rickmers, W. Bauer, M. Sippel, S. Stappert</i> (DLR, DE)	hisst-2018_15901025 A Multi-Objective Optimization for the Aerodynamic Configuration of a Re-entry Vehicle based on MOEA/D. <i>Yi Li, Su Cao, Shuo Tang</i> (NPU, CN)
11:00	hisst-2018_18401076 Interaction of Free and Bow Shock Waves with Local Gas Inhomogeneities. <i>O. Sutyryn, V. Levin</i> (MSU; IMech MSU; TsAGI, RU); <i>P. Georgievskiy</i> (MSU, IMech MSU, RU)	hisst-2018_13801027 Two Motion of Freedom Piston Pump Developed for Hypersonic Aircrafts. <i>Lingfeng Wang, Chengjian Pan, Wenqing Shao</i> (BATI, CN); <i>Jian Ruan, Sheng Li, Liang Chang</i> (Zhejiang TU, CN)	hisst-2018_36601057 Experimental Study of the Influence of Small Angles of Attack and Bluntness of a Cone on Stabilization of Hypersonic Boundary Layer Using a Passive Porous Coating. <i>S. Morozov, S. Lukashevich, A. Shiplyuk</i> (ITAM SB RAS, RU)	hisst-2018_39801107 Multi-disciplinary Design and Optimisation of a Minimum Scale Hypersonic Flight Demonstrator. <i>R. Wuilbercq, J. Y. Andro, L. Serre, A. Tremolet</i> (ONERA, FR); <i>H. Taguchi</i> (JAXA, JP)
11:30	Coffee Break			

Thursday, November 29			
08:30			
09:00			
09:30			
Hall	<i>Gogol</i>	<i>Dostoevsky</i>	<i>Turgenev</i>
Topic	G&C-3	M&S-2	TEM-2
Chair	<i>O. Janova</i> (TsAGI, RU); <i>A. Golikov</i> (TsAGI, RU)	<i>G. Dugast</i> , (MBDA-INSA Centre Val de Loire, FR); <i>K. Zhirikhin</i> (TsAGI, RU)	<i>A. Viviani</i> (Univ. della Campania "Luigi Vanvitelli", IT); <i>Bing Liu</i> (NPU, CN)
10:00	hisst-2018_26601040 New Generation of Adaptive Guidance Systems for Aerospace Transport Systems. <i>O. Yanova, A. Filatyev, S. Petrokovsky</i> (TsAGI, RU)	hisst-2018_1090835 Sparse Locally Linear Embedding for Modal Identification. <i>Wei Guan, L. L. Dong</i> (Xi'an Jiaotong Univ., CN)	hisst-2018_1430831 Statistical Simulation of the Hypersonic Aircraft Pressurized Compartment and Surface Cooling System Thermal State. <i>S. Gusev, V. Nikolaev</i> (SibNIA, RU)
10:30	hisst-2018_33301012 Integrated Optimization of Aerospace Vehicles based on the Maximum Principle. <i>A. Golikov, A. Filatyev, B. Akobyan</i> (TsAGI, RU)	hisst-2018_540926 Time-domain Dynamic Response Prediction: from One Boundary Condition to Another. <i>Jiaming Zhou, Longlei Dong, Guirong Yan</i> (Xi'an Jiaotong Univ., CN)	hisst-2018_2280892 Numerical Assessment of a Transpiration Cooled Wedge with adapted Permeability. <i>Ch. Dittert, H. Böhrk</i> (DLR, DE); <i>S. Löhle</i> (Stuttgart Univ., DE)
11:00	hisst-2018_37001103 Health Monitoring of Aircraft Components and Assemblies through Non-destructive Methods. <i>A. Chekin, I. Roberov, D. Figurovsky, V. Grama, D. Matveev, M. Kiselev</i> (GosNIIAS, RU)	hisst-2018_2090907 Structural Design of High-speed Vehicle with Topology Optimization. <i>Tong Gao, Lei Tang, Zhiguang Zhao, Longlong Song, Xueying Qiu, Dihuan Wu</i> (NPU, CN); <i>Guanghai Shi, Qianying Zhou, Dongliang Quan</i> (BATI, CN)	hisst-2018_560883 Large Eddy Simulation of Combustion in Full-scale Kerosene Fueled RBCC Engine. <i>Bing Liu, Guoqiang He, Fei Qin, Duo Zhang, Xianggeng Wei</i> (NPU, CN)
11:30			

Thursday, November 29				
Hall	Vrubel	Onegin	Pechorin	Bunin
Topic	HFH-3	PSC-9	T&E-7	M&V-3
12:00	hisst-2018_3280998 A Simple Extending Strategy for TENO Scheme: Scalar Equation and Euler Equations. <i>Fan Zhang, Chunguang Xu</i> (Sun Yat-sen Univ., CN); <i>Jun Liu</i> (Dalian TU, CN)	hisst-2018_26001011 On Shock Train Interaction with Combustion Oscillations in a Cavity Flame Holder During Accelerating Experiments. <i>Huan Lian, Hongbin Gu, Lianjie Yue, Xinyu Chang</i> (IMEch, CN)	hisst-2018_1620842 Performance and Stability Analysis of a Hypersonic Vehicle for a Low Speed Flight Test Program. <i>T. Bykerk, D. Verstraete</i> (Sydney Univ., AU); <i>S. Wolf, V. Villace, J. Steelant</i> (ESA-ESTEC, NL)	hisst-2018_40801128 Research Methods for Electric Actuator Characteristics of High-speed Unmanned Aerial Vehicle in Aeroservoelasticity Tasks. <i>S. Parafes, I. Turkin</i> (MAI, RU)
12:30	hisst-2018_1170817 Dynamical Detonation Stabilization of Supersonic Combustible Mixtures in Expanding Channels. <i>Xiaodong Cai, Jianhan Liang, Zhiyong Lin</i> (NUDT, CN); <i>R. Deiterding</i> (Southampton Univ., UK)	hisst-2018_2510935 Effect of Suction on a Sort of Supersonic Inlet. <i>Ming Gao, Huacheng Yuan, Tao Yin, Rongwei Guo</i> (NUAA, CN)	hisst-2018_29801111 Investigation of the Influence of the Perforated Walls of the T-128 Wind Tunnel on the Aerodynamic Characteristics of the Reentry Vehicle at Transonic Speed. <i>A. Gorbushin, S. Glazkov, A. Semenov, A. Lidovskiy, A. Podpaskov, G. Troshkov</i> (TsAGI, RU)	hisst-2018_1280823 Mars Sample Return: Entry Descent And Landing Analyses For Architecture Assessment Study. <i>G. De Zaiacomo, I. Pontijas Fuentes, S. Centuori, P. Hermosín</i> (Deimos Space S.L.U., ES); <i>H. Johnson</i> (MDA Corp., CA)
13:00	hisst-2018_1400830 Asymptotic Theory of the Viscous Transonic Gas Flow. <i>A. Bogdanov</i> (IMEch MSU, RU)		hisst-2018_39201167 Study on the Effect of the Base Area to the Suction Performance in the Supersonic Ejector. <i>S. Hasegawa, K. Tani, T. Kanda</i> (Research Unit IV, JAXA, Chubu University, JP)	hisst-2018_34301048 On the Concept of Cleaning Near-Earth Space from Space Debris Using the Re-entry Vehicles with Aerodynamic Braking Systems. <i>A. Medvedskiy, O. Alifanov, V. Kul'kov, V. Terentyev, S. Firsyuk</i> (MAI, RU); <i>V. Finchenko</i> (Lavochkin SPA, RU)
13:30	Lunch			
14:30	Plenary 6 (Vrubel hall) Session Chair: Adam Siebenhaar (Mach 7H, USA)			
15:00	Flows with Combustion and Detonation. Physical and Computational Experiment. <i>Vladimir Levin</i> (Institute of Mechanics of MSU, Russia)			
15:30	Coffee Break			

Thursday, November 29				
Hall	Russia	Dostoevsky	Turgenev	Hall
Topic	G&C-3	M&S-2	TEM-2	Topic
12:00	hisst-2018_1600874 A Multiobjective Hypersonic Reentry Trajectory Optimization Model. <i>L. Hongqing, Zhanxia Zhu, Y. Jianping</i> (NPU, CN)	hisst-2018_990964 Determination of Thermophysical Properties for Short Fibers Reinforced Phenolic Composite and Its Thermal Behaviour under Kerosene/Air Flame. <i>G. Dugast, K. Chetehouna, N. Gascoin, M. Bouchez, J.L. Marceau</i> (MBDA-INSA Centre Val de Loire, FR)	hisst-2018_1270944 Soft-objects based Procedure for Thermal Protection System Modelling of Reusable Launch Vehicles. <i>A. Arovitola, L. Iuspa, C. Rainone, A. Viviani</i> (Università della Campania "Luigi Vanvitelli", IT)	12:00
12:30	hisst-2018_1460891 Damage Detection and Localisation of CMCs by Means of Electrical Health Monitoring. <i>T. Staebler, H. Böhrk, H. Voggenreiter</i> (DLR, DE)	hisst-2018_590798 Experimental and Numerical Investigation on Startup of Leading-Edge-shaped Heat Pipes. <i>Chen Siyuan, Ai Bangcheng, Han Haitao, Hu Longfei, Chu Min, Chen Liang</i> (CAAA, CN)	hisst-2018_370870 The TPS Design of a Reusable Launch Vehicle based on Active Cooling. <i>Jian-Jun Gou, Jia-Xin Hu, Chun-Lin Gong, Bing Chen, Liang-Xian Gu</i> (NPU, CN)	12:30
13:00			hisst-2018_1670845 Numerical Study on a Multi-Sample Transpiration-Cooled Channel Flow. <i>A. Trübsbach, Ch. Kromer, M. Selzer</i> (DLR, DE); <i>A. Schwab</i> (Stuttgart Univ., DE)	13:00
13:30				
14:30				
15:00				
15:30				

Thursday, November 29				
Hall	Vrubel	Onegin	Pechorin	Turgenev
Topic	A&A-9	PSC-10	T&E-8	O&S-2
Chair	Cui Kai (IMEch CAS, CN); F. Teschner (Bundeswehr Muenich Univ., DE)	P.R. Ess (DLR, DE), D. Lapinsky (TsAGI, RU)	S. Hasegawa (JAXA, JP); Shizhong Zhang (IMEch CAS, CN)	R. Fusaro (Politecnico di Torino, IT); Qian Zhansen (AVIC ARI, CN)
16:00	hisst-2018_2830937 Effects of the Lift-to-drag Ratio on Climbing Characteristics of Reusable Launch Vehicles. Cui Kai, Xu Yingzhou, Li Guangli, Xiao Yao, Wang Haoxiang (IMEch CAS, CN)	hisst-2018_1701068 Experimental Investigation of the Hydrogen Combustion Chamber and its Complement with 2.5D CFD Data. V. Talyzin, V. Vlasenko, O. Voloschenko, M. Ivankin, A. Nikolaev (TsAGI, RU)	hisst-2018_43101169 Novel Transient Calorimetric Heat Flux Sensor in Hypersonic Ground Experiment. Shizhong Zhang, Jinping Li, Hong Chen, Xiaoyuan Zhang, Hongru Yu (IMEch CAS, CN)	hisst-2018_10801022 Dynamic Airspace Sectorization to Enable Flight Centric Operations. M. Schultz, A. Temme, I. Gerdes (DLR, DE)
16:30	hisst-2018_38501137 Computation of Hypersonic Flows on Compression Corner using modified k-ω model. A. A. Pasha, Kh. A. Juhany (King Abdulaziz Univ., SA)	hisst-2018_39501104 Simulation of Pressure Gain Combustion in a Wave Rotor. P. R. Ess (DLR, DE)	hisst-2018_1990866 The Preliminary Application of MHD Power Generation in Arc Heated Test. Ou Dongbin, Chen Lianzhong, Gao He, Zhu Anwen, Liu Lei, Peng Yan, Liu Baolin (CAAA, CN)	hisst-2018_24701082 Towards Future LH2 Productive Scenarios. R. Fusaro, V. Vercella, D. Ferretto, N. Viola (Politecnico di Torino, IT); V.F. Villace, J. Steelant (ESA-ESTEC, NL)
17:00	hisst-2018_2460966 Reentry Blackout Simulation Using CFD Combined with Radio Transmission Calculation. Hu Ning (PKU, CN)	hisst-2018_2430905 Design and Aerodynamic Performance Analysis of a Axisymmetric Variable Geometry Inlet. Yunfei Wang, Huacheng Yuan, Jinsheng Zhang, Zhenggui Zhou (NUAA, CN)	hisst-2018_40901130 Development and Performance Validation of Konkuk University Ludwig Tube (KULT). Sungmo Yang, Yung Hwan Byun, Soo Hyung Park (Konkuk Univ., KR)	hisst-2018_1660844 Integration and Evaluation of the Impact of Space Vehicle Operations in the European ATM. T. Luchkova, S. Kaltenhäuser, N. Klay, M. Schultz (DLR, DE); R. B. R. Ang (NTU, SG)

● **Guidance & Control Systems**

hisst-2018_1130819
Optimized Reentry Trajectories for Winged RLV Stages
L. Bussler
German Aerospace Center (DLR) Institute of Space Systems, Germany

Speaker: Leonid Bussler
Space Launcher Systems Analysis (SART) — DLR Institute of Space Systems, Bremen;
Since 2015: Scientific staff in SART department at DLR Institute of Space Systems, Bremen;
2012 — 2015: Controller Spacecraft Operations, SES.

Synopsis:

hisst-2018_1580867
Bringing Highly Efficient RLV-Return Mode "In-Air-Capturing" to Reality
M. Sippel, L. Bussler, S. Krause, S. Cain
German Aerospace Center (DLR), Germany

Speaker: Dr. Martin Sippel
Head of DLR (German Aerospace Centre)'s Space Launcher Systems Analysis (SART) in the Institute for Space Systems (Bremen).

Synopsis: The SpaceLiner ultra-high-speed rocket-propelled passenger transport is in Phase A conceptual design. The critical separation of the passenger cabin and rescue capsule and its subsystems are one topic of the paper. The separation process is critically investigated taking into account multi-body dynamics and advanced CFD-simulations. Potential intercontinental flight routes, considering range-safety and sonic boom constraints as well as good reachability from major business centers, are evaluated.

hisst-2018_1280824
Space Rider: Entry and Taem GNC of the Future European Reusable Space Transportation System
G. De Zaiacomo, C. Recupero, A. Pagano, M. Kerr, P. Rosa, R. Haya-Ramos
Deimos Space S.L.U., Spain

Speaker: Gabriele De Zaiacomo
Senior Engineer in the Atmospheric Flight Competence Centre at the Flight Systems B.U. at DEIMOS Space, with 11 years' experience in Mission Analysis and GNC for atmospheric flight, including flight mechanics, re-entry systems, and entry guidance.

Synopsis: This paper focuses on the Entry, Descent and Landing (EDL) Mission Analysis verification activities of the ESA/Roscosmos ExoMars 2020 mission, presenting the activities performed by DEIMOS Space in the programme Phase C to support the EDL Critical Design Review (CDR) in strict collaboration with Thales Alenia Space.

hisst-2018_38001112
Aircraft Actuating System Fault Diagnosis under Complete Uncertainty
E. Zybin, V. Kosyanchuk, S. Karpenko
GosNIIAS, Russia

Speaker: Eugene Zybin

Synopsis:

hisst-2018_1770922
Design of the Actuation System of the HEXAFly-INT Hypersonic Glider
J.-Y. Andro¹, F. Nebula², W. Rotärmel³; J. Steelant⁴
¹ONERA, France; ²CIRA, Italia;
³German Aerospace Center (DLR), Germany;
⁴ESA-ESTEC, Netherlands

Speaker: Jean-Yves Andro
Master of Engineering in Aeronautics & Astronautics, PhD in Aerodynamics Senior Research Engineer at

ONERA: Hypersonic Vehicles Design, Aerothermodynamics, Thermal Management, Engineering.

Synopsis: This paper presents the thermal management of the HEXAFLY-INT hypersonic glider. It describes first the choice of materials for the different components of the vehicles and the selected external Thermal Protection System. Then, it deals with the design of the internal Thermal Control System of the equipment: internal thermal protection against radiation, insulation washers at the fixation point, heat storage device based on Phase Changing Material.

hisst-2018_11201006

Optimum Trim of an Experimental Hypersonic Glider

V.F. Villace
ESA, Netherlands;
S. Takovitskii
Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: Victor Fernandez Villace

Synopsis:

hisst-2018_1630843

Development of High Speed Flying Vehicle on-Board Integrated Navigation, Control and Guidance System

M. Krasilshchikov
Moscow Aviation Institute, Russia
K. Sypalo
Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: Mikhail Krasilshchikov

Synopsis:

hisst-2018_1860856

Trajectory and Flight Mechanics Analysis of the HEXAFLY-INT Experimental Flight Vehicle

G. Morani, F. Nebula, S. Di Benedetto, M. P. Di Donato
CIRA, Italy
J. Steelant
ESA-ESTEC, Netherlands

Speaker: Francesco Nebula

Senior Researcher at CIRA (Italian Aerospace Research Centre) with experience on algorithms for autonomous flight, particularly on the navigation. His education includes a Master degree in Aeronautical Engineering and a PhD in Information Engineering.

Synopsis: In the HEXAFLY-INT project, the Experimental Flight Test Vehicle (EFTV) will perform a sub-orbital trajectory with an apogee at 90 km. After the release at 55 km, it will perform a pull-out manoeuvre bringing it to a leveled flight, while the experimental phase will start at Mach 7. The mission objectives and constraints are considered as inputs in the trajectory generation process. The paper describes this process and the dispersion analysis as well, taking into account the available uncertainties.

hisst-2018_37001100

Optimal Climbing Trajectories of Hypersonic Aircraft based on Direct Methods of Flight Dynamics

A. Chekin, M. Kiselev, Ya. Moroshkin
GosNIIAS, Russia

Speaker: Andrey Chekin

Synopsis:

hisst-2018_1800991

Differential Flatness-Based Finite Time Sliding Mode Control of Hypersonic Vehicle

W. Yuxiao, Tao Chao, Songyan Wang, Ming Yang
Harbin Institute of Technology, China

Speaker: Yuxiao Wang

Harbin Institute of Technology, Control and Simulation Center Reporter, email: chaotao2000@163.com.

Synopsis: Differential flatness method is applied to the linearization of the longitudinal model of HV. A finite time convergent controller is designed for the nominal linearized model. Then an integral sliding mode controller is added to deal with the uncertainty of the system. In addition, a discrete linear tracking differentiator (TD) is used to extract high order differential signal of the system, which can avoid the high order differential signal polluted in the numerical calculation.

hisst-2018_33301012

Integrated Optimization of Aerospace Vehicles Based on the Maximum Principle

A. Golikov, A. Filatyev, B. Akobyan
Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: Alexander Golikov

Education: 1989.
Master of Science: Moscow Institute of Physics and Technology (MIPT).
1989 — Present: Central Aerohydrodynamic Institute (TsAGI), Senior Research Scientist, Flight Dynamics & Control Division.

Synopsis: The technique of integrated optimization of aerospace vehicle parameters and trajectories by the united criterion of target efficiency is described. The technique uses a decomposition of a multidisciplinary problem into single-disciplinary subtasks of flight dynamics and control, aerodynamics, propulsion and structures based on the Pontryagin maximum principle. The qualitatively new optimal solutions in comparison with traditional ones are revealed due to the proposed approach.

hisst-2018_37001103

Health Monitoring of Aircraft Components and Assemblies through Non-destructive Methods

A. Chekin, I. Roberov, D. Figurovsky, V. Grama, D. Matveev, M. Kiselev
GosNIIAS, Russia

Speaker: Andrey Chekin

Synopsis:

hisst-2018_1600874

A Multiobjective Hypersonic Reentry Trajectory Optimization Model

L. Hongqing, Zhanxia Zhu, Y. Jianping
Northwestern Polytechnical University, China

Speaker: Hongqing Liu

Synopsis:

hisst-2018_1460891

Damage Detection and Localisation of CMCs by Means of Electrical Health Monitoring

T. Staebler, H. Böhrk, H. Voggenteiler
German Aerospace Center (DLR), Germany

Speaker: Tina Staebler

After graduating as aerospace engineer in 2014 Tina Stäbler started her Ph.D. at the German Aerospace Center (DLR) in Stuttgart. She is now project leader of IRAS, where an integrated research platform for affordable satellites is developed.

Synopsis: In this work electrical resistance measurements are used to detect damages in a TPS. It will be shown, that this method reacts even to small damages where less than 0.02% of the monitored surface is damaged and defects can be localised.

● **High-Speed Aerodynamics and Aerothermodynamics**

hisst-2018_3101062

ADVANCE: A Space Vehicle Analysis and Design Tool

J. Steelant, J. Van den Eynde
European Space Agency — ESTEC, Netherlands
Ph. Reynier
Ingénierie et Systèmes Avancés, France

Speaker: *Johan Steelant*

Johan Steelant graduated in 1989 (University of Ghent) as mechanical Engineer, in 1990 from the University of Brussels as aerospace engineer. He got his PhD on turbulence and transition modelling at the University of Ghent. Presently working at EUROPEAN SPACE AGENCY — ESTEC.

Synopsis:

hisst-2018_1620897

High and Low Speed Analysis of a Re-usable Unmanned Re-entry Vehicle

T. Bykerk, D. Verstraete
The University of Sydney, Australia
G. Pezzella
CIRA, Italy
A. Viviani
University of Campania, Italy

Speaker: *Tamas Bykerk*

PhD student at the University of Sydney, researching the low speed handling qualities of hypersonic vehicles. My specialisation is in experimental aerodynamics and CFD.

Synopsis: Re-usable, unmanned re-entry vehicles are an efficient way to experimentally validate next generation re-entry technologies. During the descent phase, free-stream velocities ranging from hypersonic to low subsonic are encountered, which requires a careful choice of aeroshape. Results from the V-one aircraft, developed by CIRA, are presented. These include aerodynamics, static stability and control authority at both low and high speed. Low speed studies are supported by a wind tunnel tests.

hisst-2018_2940957

Aerodynamic and Aerothermodynamic Database of the HEXAFly-INT Hypersonic Glider

A. Schettino, G. Pezzella, M. Marini, S. Di Benedetto
CIRA, Italy
V.F. Villace, J. Steelant
ESTEC-ESA, Netherlands
A. Gubanov, N. Voevodenko
Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: *Antonio Schettino*

He works since 1990 in the field of Computational Fluid Dynamics, being involved in CFD codes development and applications mainly in the fields of Aerothermodynamics and liquid propulsion. He is currently head of Aerothermodynamics Unit at CIRA.

Synopsis: The paper is devoted to the aerodynamic and aerothermodynamic characterization of the HEXAFly-INT hypersonic glider, developed in the frame of an international project co-funded by EU and ESA. The project is aimed to design, manufacture and test in flight an innovative gliding hypersonic vehicle, characterized by high aerodynamic efficiency and equipped with several breakthrough technologies. The aero-database is built by means of several CFD simulations and a dedicated experimental test campaign.

hisst-2018_3250999

Dynamic Effects of MHD Interaction in Hypersonic Flow Under Ground-Based Experiment Conditions

S. Bychkov, D. Baranov, V. Bityurin, A. Bocharov, V. Grushin, N. Tretyakova
Joint Institute for High Temperatures (JIHT), Russia
N. Batura, N. Kolushov, E. Vasilevsky, N. Zhurkin
Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: *Sergey Bychkov*

Synopsis: The main purpose of the experiment-calculated studies is to determine the scale of the dynamic effect caused by changes in gas-dynamic forces on the surface of an aircraft as a result of the magneto

hydrodynamic interaction of a high-velocity flow with a strong magnetic field. The practical prospect of the research is related to the use of electric and magnetic fields to develop new methods for controlling the flow of a flying body by a gas-plasma stream.

hisst-2018_2670918

Numerical Simulation of Transpiration Cooling Experiments in Supersonic Flow using OpenFOAM

D. Prokein, J. von Wolfersdorf
ITLR, Germany
C. Dittert, H. Böhrk
German Aerospace Center (DLR), Germany

Speaker: *Daniel Prokein*

Researcher at the Institute of Aerospace Thermodynamics (ITLR) in Stuttgart, Germany and working on his Ph.D. thesis on the topic of “Numerical and experimental investigations on transpiration cooling applied to CMC materials” (to be completed in 2019).

Synopsis: In the given study, we present a fully coupled OpenFOAM solver that is capable of simulating transpiration cooling processes for complex porous structures exposed to hot supersonic main flows. The solver is applied to testcases with a flat and a double wedge porous CMC sample and compared to experimental data for validation purposes. The numerical results are in good overall agreement with the measurements while capturing the influences of blowing ratio as well as variations of the external flow field.

hisst-2018_16501075

Experimental Investigation of the Boundary Layer State Hysteresis and its Influence on the Starting of the Streamline-traced Intake

V. Golubkin, S. Aleshin, A. Gubanov, I. Nazhimov, V. Talyzin, Yu. Shvalev, V. Yakovleva
Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: *Valeriy Golubkin*

Professor, doctor of technical sciences; leading researcher of the Central Aerohydrodynamic Institute n.a. prof N.E. Zhukovsky. Basic results in unsteady aerodynamics under the impact of weak shock waves; general properties of viscous.

Synopsis: The results of thermal testing of high-speed aircraft model with the streamline-traced dorsal intake and internal power engine duct in the super/hypersonic TsAGI T-116 wind tunnel are presented. Boundary layer state on the compression intake surface was found to depend on a flight regime and particular type of turbulence stimulators. In addition to mass flow rate hysteresis found earlier, the boundary layer state hysteresis was discovered to accompany forward and reversed angle-of-attack change for definit.

hisst-2018_2930950

Direct Numerical Simulation of Mach Wave and Supersonic Boundary Layer Interaction

I. Egorov
Central Aerohydrodynamic Institute (TsAGI), Russia
Q. Din, A. Fedorov
Moscow Institute of Physics and Technology, Russia

Speaker: *Ivan Egorov*

Synopsis:

hisst-2018_2340898

Distinctive Features of Heat Exchange and Laminar-turbulent Transition in Hypersonic Boundary Layers on Flat Blunted Bodies

V. Shalaev, M. Starodubtsev
Moscow Institute of Physics and Technology, Russia
S. Alexandrov, A. Vaganov
Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: *Vladimir Shalaev*

Synopsis:

hisst-2018_2760930

Study on 3D Lattice Boltzmann Method for High-speed Viscous Flows

Ruofan Qiu, Yancheng You, Rongqian Chen, Chenxiang Zhu, Jianfeng Zhu
Xiamen University, China

Speaker: *Ruofan Qiu*

Postdoctor of School of Aerospace Engineering, Xiamen University. Completed PHD from Tongji Univer-

sity. Research work focus on advance CFD method, compressible lattice Boltzmann method, mechanics of complex supersonic flows, etc.

Synopsis: The lattice Boltzmann method, which is based on microscopic models and mesoscopic kinetic equations for particle distribution functions, has become a prominent tool in CFD. The 3D lattice Boltzmann method in the framework of coupled double-distribution-function approach for high-speed viscous flows, in which specific-heat ratio and Prandtl number can be adjustable, is developed and studied in this paper.

hisst-2018_43301174

Effect of Reacting Flow on Flutter at Hypersonic Flight Speed

V. Vedeneev
Lomonosov Moscow State University, Russia
V. Nesterov
Moscow Aviation Institute, Russia
A. Medvedskii, K. Sypalo
Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: *Vasily Vedeneev*

Vasily Vedeneev is an associate professor at the Faculty of Mechanics and Mathematics, and a head of lab in the Institute of Mechanics of Lomonosov Moscow State University. His research fields are aeroelasticity, hydroelasticity, and hydrodynamic stability.

Synopsis: In the flutter analysis of supersonic flight vehicles, the air is usually considered as perfect gas, and linearised aerodynamic theory is used. At hypersonic speeds, two effects become significant: aerodynamic nonlinearity and chemical reactions in the flow. While the first effect was excessively studied in literature, the effect of reactions with respect to flutter was not studied previously. In this paper we analyze the changes in the flutter theory produced by chemical reactions.

hisst-2018_2030871

Analysis of Hypersonic Model Pitching Experiments in the TUSQ Facility

N. Stern, D.R. Buttsworth, R. Choudhury, B. Reimann
School of Mechanical and Electrical Engineering,
University of Southern, Queensland, Australia

Speaker: *Nathan Stern*

Nathan Stern is a PhD student from the University of Southern Queensland, Australia. His thesis topic is the development of small-scale robots, used to demonstrate hypersonic control in the Mach 6 Ludweig tube facility.

Synopsis: Experiments have been performed in the TUSQ hypersonic facility on the control of hypersonic models using 3D printed test models fitted with on-board actuation and data-sampling electronics. Analysis of experiments on a pivoted body with an actuated elevator is proceeding through the use of analytical and computational simulations. Our aim is to attempt to emulate the control system using CFD packages such as Eilmer 4 and the DLR TAU-Code.

hisst-2018_13401004

Method for Solving the Equations Describing the Interaction of a 3-D Boundary Layer with an Outer Inviscid Supersonic Flow

G. Korolev
Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: *Georgii Korolev*

Born: November 10, 1952 E-mail: glk777@mail.ru, phones: +7903-133-55-001999 DSc. 1988 First Zhukovskiy Prize Winner in hydrodynamics, USSR.

Synopsis: Advanced computational method is developed for solving the three-dimensional time-independent equations describing the interaction of a laminar boundary layer with an outer inviscid flow. By applying the method, the problem of the three-dimensional viscous supersonic gas flow over a roughness element (a hump and a cavity) is solved for the first time within the framework of the classical triple-deck theory. The asymptotic height of the roughness element corresponding to the non-separated flow is determined.

hisst-2018_1070895

Generation of Three-dimensional Disturbances in a Boundary Layer on Strong Interaction

G. Dudin, V. Neyland
Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: *Georgiy Dudin*

Prof. TsAGI, Chief research officer. Investigate and apply the asymptotic and numerical methods to solve the fundamental problems of modern aerodynamics and three-dimensional boundary layer on strong interaction.

Synopsis: Laminar boundary layer flow over an infinite-span, finite-length flat plate is investigated in the regime of strong interaction with a hypersonic gas flow. Under the assumption that an additional condition dependent on the transverse coordinate can be imposed on the trailing edge of the plate the flow functions are expanded in power series in the vicinity of the leading edge. It is shown that these expansions include an indefinite function dependent on the transverse coordinate.

hisst-2018_910807

Acoustic Diagnostics of Instability Waves in Supersonic Jet

V. Kopiev, M. Zaytsev, S. Chernyshev
Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: *Victor Kopiev*

Synopsis:

hisst-2018_19601030

Amplitude Method of Laminar-turbulent Transition Prediction in Three-dimensional Supersonic Boundary Layer at Swept Wing

M.V. Ustinov
Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: *Maksim Ustinov*

Maksim V. Ustinov was born 26 September 1961. He graduates from Moscow Physical Technical Institute in 1984. Ph. in Physics and Mathematics in 1988. Now

works in TsAGI as a deputy chief of Department. Topics of interest: laminar-turbulent transition.

Synopsis: Amplitude method describing influence of surface roughness and free-stream turbulence level on laminar-turbulent transition caused by cross-flow instability is developed and tested. It is based on computation of amplitudes of steady and non-steady cross-flow instability modes in the boundary layer. Method developed was verified using available experimental data obtained in low-speed wind tunnels and applied for transition prediction in the swept-wing boundary layer for supersonic speed.

hisst-2018_70810

Estimation of Laminar-to-turbulent Transition using Empirical and Numerical Methods for Various Aerodynamic Forms

N. Voevodenko, A. Gubanov, D. Ivanyushkin, Yu. Shvalev
Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: *Nina Voevodenko*

Ph.D. graduated from MIPT Faculty of Aerodynamics and Flight Dynamics. She is Head of Sector of TsAGI's Aerodynamic Dep. Author of more than 60 publications. Research Topics: Highspeed Aerodynamics, CFD, theoretical and analytical methods.

Synopsis: This paper presents the results of methodological studies aimed to determine the position of the laminar-to-turbulent transition using empirical criteria and CFD methods. The criteria of Simeonides and Berry have been studied, and results are compared with experimental data and CFD results, RANS solution with transition turbulence model. Studies were carried out for flat plate, and cones at Mach $M = 2 \dots 10$ and Reynolds $Re = (3 \dots 45) \cdot 10^6$. Methods are applied also on HEXAFly-INT glider model.

hisst-2018_1880875

Influence of Active Cooling on Second Mode Instabilities Investigated on Hypersonic, Conical Flows

V. Wartemann, P. Reiter, A. Wagner, G. Ponchio Camillo
German Aerospace Center (DLR), Germany

Speaker: Viola Wartemann

Dr. Viola Wartemann is working as researcher at the German Aerospace Center (DLR) since over 10 years. Besides her studies on hypersonic boundary layer transition and re-entry aerodynamics, she is involved in several international European Research Project.

Synopsis: In the paper the influence of active cooling on second mode instabilities is investigated on hypersonic, conical flows.

hisst-2018_1100813

Micro-Aerothermodynamic Analysis of Protuberances and Clearances on a Hypersonic Glider using a Reduced Domain Approach

R. Choudhury, V.F. Villace, J. Steelant
European Space Agency — ESTEC, Netherlands
D. Buttsworth
University of Southern Queensland, Australia

Speaker: Rishabh Choudhury

International research fellow at ESA ESTEC, on secondment from the University of Southern Queensland, Australia, where I'm a research fellow on experimental hypersonics. I completed my PhD from the University of New South Wales, Australia.

Synopsis: An aerothermodynamic analysis was carried out for the HEXAFly-INT hypersonic glider incorporating geometrical elements such as wing-aileron gap, aileron hinge cavities, and communication antennas. These features exhibited localised changes to the flow-field affecting local heat-transfer distribution and control surface efficiency as compared to the existing "clean" aerodynamic (AEDB) model. The methodology presented in this paper is based on a reduced flow field domain to minimise computational costs.

hisst-2018_510879

Numerical and Experimental Analysis of Rarefaction Effects on Aerodynamic Coefficients of a Slender Re-entry Vehicle

K. Hannemann, C. Hepp, T. Schlegat, M. Grabe
German Aerospace Center (DLR), Germany

Speaker: Klaus Hannemann

Synopsis:

hisst-2018_960884

Experimental Investigation of Rarefaction Effects on Aerodynamic Coefficients of Slender and Blunt Re-entry Vehicles

T. Schlegat, K. Hannemann
German Aerospace Center (DLR), Germany

Speaker: Thomas Schlegat

2003 Study of Aerospace Engineering, University of Stuttgart
2008 Occupational Trainee at the Centre of Hypersonics, University of Queensland, Brisbane
2009 PhD student at the Spacecraft Department of the DLR, Göttingen
2016 Missile Analyst, IABG, Ottobrun.

Synopsis: The experimentally investigated effects of rarefaction on the aerodynamic coefficients of a slender high lift/drag configuration are compared with those of a classical blunt-shaped lifting body at angles of attack between 0 and 34° and Knudsen numbers between $7e^{-4}$ and $9e^{-3}$. The ground based testing is conducted in the 2nd test section of the DLR Hypersonic Vacuum Wind Tunnels Göttingen and yielded about 900 experimentally obtained data sets of lift, drag and pitching moment coefficients and lift/drag ratio.

hisst-2018_31501116

Effects of Injection on the Boundary Layer Stability over a Blunt Body

A. Obraz, A. Fedorov
Moscow Institute of Physics and Technology, Russia
N. Palchekovskaya, I. Egorov
Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: Anton Obraz

2009: Bachelor degree at MIPT

2011: Master of Science at MIPT

2011—present: Researcher at TsAGI

2011—present: Researcher at MIPT.

Synopsis: The effect of wall normal gas injection on the boundary layer stability is simulated numerically for the hypersonic flow over the blunted body. The boundary layer stability is analyzed with the linear stability theory and e-N method. For all cases considered, the critical N-factors at the experimentally observed loci of the transition onset are small. The correlation is observed between the computed critical stability points and experimental transition onset loci at various intensities of the injection.

hisst-2018_2890979

Mathematical Simulation, Numerical and Experimental Investigation of Nonspherical Bodies' Motion in Nonuniform Flows

I. Amelyushkin
Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: Ivan Amelyushkin

PhD in Physics and Mathematics; TsAGI Senior Researcher; Lector in MIPT and MSU.

Synopsis: The complexity of mathematical modeling of nonstationary dynamics of multiple bodies in inhomogeneous flows and the significant stochastic nature of their trajectories in gradient media under experimental investigation lead to construction of original approaches in mathematical and numerical simulation of the dynamics of chaotic clouds of bodies of complex shapes. Results of shape influence on trajectories' stochastic and spreading of nonspherical bodies in gradient flows are obtained and presented in terms.

hisst-2018_1810855

Interaction of a Solid Body with a Multiphase Supersonic Flow: Physico-mathematical Models and Numerical Investigations

G. Molleson, A. Stasenko
Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: Galina Molleson

Synopsis:

hisst-2018_1300826

Intermittency-based Transition Model with Local Empirical Correlations

J. Van den Eynde, J. Steelant
European Space Agency, Netherlands

Speaker: Jeroen Van den Eynde

Jeroen Van den Eynde is an Aerothermodynamics Engineer in the Flight Vehicles & Aerothermodynamics Engineering section at the European Space Agency. His research interests include hypersonics and transition to turbulence.

Synopsis: A two-equation correlation-based transition model is presented to predict the onset and development of the laminar-turbulent transition process for boundary layers. It uses one equation for the intermittency transport, and another for the transport of a transition onset criterion. It uses some elements from the Langtry-Menter intermittency-based transition model, but introduces a physics-based rationale for the intermittency production and destruction.

hisst-2018_1440832

Numerical Studies of Receptivity of a Supersonic Boundary Layer to Solid Particulates

P. Chuvakhov, A. Fedorov
Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: Pavel Chuvakhov

2007, Bachelor of science, Moscow Institute of Physics and Technology (MIPT) 2009, Master of science, MIPT 2013, Ph.D., Central Aerohydrodynamic Institute (TsAGI) 2009—present, researcher of TsAGI and MIPT; lecturer assistant of MIPT.

Synopsis: Atmospheric particulates may be a major source of boundary layer instabilities leading to laminar-turbulent transition on aerodynamically smooth bodies flying at supersonic speeds. The paper introduces a numerical model to simulate the particulate effect on receptivity and stability. Comparison with theory is given.

hisst-2018_880908

Numerical Simulation of Mass Addition Effect on Heat Transfer of Descent Space Vehicle

N. Palchekovskaya, I. Egorov

Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: *Natalia Palchekovskaya*

PhD Research field: — Theoretical hydrodynamics — Computational Fluid Dynamics — Numerical Simulation of Separated, Vortex Flows.

Synopsis: Numerical study of mass addition influence on heat transfer of two models of descent space vehicle at hypersonic flow regimes is carried out. Numerical simulation is fulfilled using Navier-Stokes equations in axisymmetric statement. Various mass flow rates are considered in order to investigate effect of gas injection on values of heat flux. Comparison of the results with experimental results and numerical results of other authors is made.

hisst-2018_870841

Application of RANS/LES Hybrid Method in Simulation of Supersonic Base Flow

Fu Weijia, Ma Jingzhong, Li Jie

AVIC Jiangxi Hongdu Aviation Industry Group, Northwestern Polytechnical University, China

Speaker: *Fu Weijia*

Education: Graduate from Northwestern Polytechnical University with a doctor's degree in Fluid Dynamics in 2016. Research Interests: Computational Fluid Dynamics; Aircraft Design and Engineering.

Synopsis: Two methods DDES, ZDES based on $k-\omega$ SST shear stress transport model with compressibility correction are applied in numerical simulation of supersonic base flow, respectively. Third-order MUSCL-Roe

and fifth-order WENO-Roe spatial scheme are used to investigate the numerical dissipation effects.

hisst-2018_1950863

Roughness-induced Instabilities Leading to Transition in a Capsule Boundary-layer under Re-Entry Conditions

C. Stemmer, A. Di Giovanni

Technical University of Munich, Germany

Speaker: *Christian Stemmer*

Since 2005 Technical University of Munich, Germany. Adjunct Teaching Professor and head of high-speed aerodynamics group 2003-2005 Research Scientist at TU Dresden, Germany 2001-2003 CTR, Stanford University, USA 2001 Ph.D. at IAG, Stuttgart, Germany.

Synopsis: We investigate roughness-induced transition scenarios for the capsule boundary layer in re-entry type scenarios with Direct Numerical Simulations (DNS). The effect of chemical equilibrium as well as chemical and/or thermal non-equilibrium on the disturbance development in the wake of the distributed roughness patch is investigated. DNS calculations are undertaken to show the non-linear evolution of the roughness wake and its interaction with unsteady disturbances.

hisst-2018_1020853

Application of a Reference Plane Method Calculating Flowfield behind Three-dimensional Elliptic Conical Shock Wave

Shi Chong-guang, Zhu Cheng-xiang, You Yan-cheng

Xiamen University, China

Speaker: *Shi Chong-guang*

Received his BE degree and BS degree in Xiamen University, China in 2016. He is currently working toward the DS degree in Xiamen University. His research interests include aerodynamic theory, shock wave and boundary layer interaction.

Synopsis: In order to solve the three-dimensional flow field behind the elliptic conical shock wave, a reference plane method is applied at the cylindrical coordinate system. The main idea is to transform the

Cartesian coordinate system into the cylindrical coordinate system. Then the three-dimensional formulas can be easily applied to calculate the projection flow field at the reference plane. After that, the actual three-dimensional flow field will be acquired by the utility of geometry conversion.

hisst-2018_690803

Numerical Simulation of Two Shear Layers Interaction in Double Backward-facing Steps

Deng Fang, Han Guilai

Institute of Mechanics, Chinese Academy of Sciences, China

Speaker: *Deng Fang*

Synopsis:

hisst-2018_2810952

Detailed Mathematical and Numerical Investigations of Shock Wave-boundary Layer Interaction in Hypersonic Flows

Sterian Danaila, Dragoş Isvoranu, Constantin Leventiu, Alina Bogoi

POLITEHNICA University of Bucharest, Romania

Speaker: *Sterian Danaila*

Professor, head of the Dep. of Aerospace Sciences, POLITEHNICA University of Bucharest. Research area: Aerodynamics, CFD, Turbulence. Visiting professor: Univ. de Poitiers (France) and NUAU (China). Published 6 text books and monographs and over 50 papers.

Synopsis: The paper focuses, first, on a comparison of the behavior of three WENO type numerical schemes for shock tube problem. Next, the paper refers to the unsteady laminar or turbulent shock wave/boundary layer interactions over compression ramps with a sharp leading edge. The in-house code (SUPERHYP) are presented and analysed. The last part presents the Proper Orthogonal Decomposition Analysis of the numerical results.

hisst-2018_13901077

Influence of Free Stream Inhomogeneity on Heat Flux and Temperature on a Plate in a Supersonic Flow

G. Nikiforov

St. Petersburg State University, Russia

Speaker: *Gleb Nikiforov*

Fourth-year student of Saint Petersburg State University. Participant of international conference "The Eighth Polyakhov's Reading" and XXV international seminar on jet, separated and non-stationary flows.

Synopsis: Influence of density inhomogeneity of supersonic flow on heat flux and temperature on a plate has been studied experimentally. The inhomogeneity of the supersonic free stream was obtained by injection of a thin helium jet into the main air stream. Such approach allows to model impact of an infinitely long heated stream of gas, with lower density than gas of the main flow, on body aerodynamics. Reorganization of the gas flow around the body leads to the considerable change of power loading and a heat flux.

hisst-2018_1970864

Aerodynamic Damping and Buffet Response Test of an Aeroelastic Launch Vehicle Model in Transonic Flow

Ji Chen

China Academy of Aerospace Aerodynamics, China

Speaker: *Ji Chen*

Dr. Chen Ji is a senior research engineer in China Academy of Aerospace Aerodynamics. He was a visiting fellow in University of London from 2015 to 2016. His research field is experimental study of aeroelasticity.

Synopsis: The aerodynamic damping and buffet response of a launch vehicle were tested at the $M_a = 0.8 \dots 1.2$ and $AoA = 0^\circ, 8^\circ$. The aerodynamic un-damping was found at the 2nd free-free bending mode at $M_a = 0.9, AoA = 8^\circ$. At different Mach numbers, the variation of the PSD peak value of the free-free bending response can be up to 14.4 times. Although the second-order aerodynamic damping was zero at $M_a = 0.9, AoA = 8^\circ$, it had a limited effect on the

second-order dynamic bending response amplitude in this test condition.

hisst-2018_460802

High Credible Simulation and Validation of Turbulence Models Effects on a Low-aspect-ratio Flying-wing Model

Li Qing

Chinese Aeronautical Establishment, China

Speaker: *Li Qing*

Qing Li was born in Xi'An city of China on Dec. 18th, 1983. She graduated from RWTH Aachen university in Germany and was honored with a Master degree in major of mechanical engineering in 2010. She has worked in Chinese Aeronautical Establishment until now.

Synopsis: Taking an advanced low-aspect-ratio aircraft flying-wing as the research model, many numerical simulation are conducted for aerodynamic characteristics at different attack angles in supersonic flow condition by using high credible CFD software AVICFD-X. The numerical results of aerodynamical coefficients are in a good accordance with wind tunnel test datas. This accordance validates the computational accuracy of AVICFD-X. The computation accuracy and efficiency by different turbulent models are estimated.

hisst-2018_2130878

Nonlinear Flutter of Curved Composite Panels in High Speed Flow

An Xiaomin

Northwestern Polytechnical University, China

Speaker: *An Xiaomin*

Education PhD, School of Astronautics, Northwestern Polytechnical University, Dec. 2009 Research Interests 1. Aeroelasticity 2. Fluid-Structure Interaction 3. Unsteady aerodynamics

Synopsis: Nonlinear aeroelastic behaviors of two cylindrical composite panels are studied in a transonic flow of $M_a = 0.96$. The cylindrical shell structure is modeled by an assemblage of flat triangular elements and the large displacement is described by a parameterization of the orthogonal matrix. Euler equation is

solved by an upwind flux splitting scheme and a dual-time technology to obtain nonlinear aerodynamic loads. Based on a loosely coupling procedure, nonlinear aeroelastic responses of the two cylindrical ...

hisst-2018_13701094

Study of Effects from Local Energy Deposition in Supersonic Gas Flow on Well-streamlined Body

Y. Dobrov, V. Lashkov, I. Mashek, R. Khoronzhuk

St. Petersburg State University, Russia

Speaker: *Yuriy Dobrov*

Synopsis:

hisst-2018_38101091

Simulation of Support Module Separation in a Hypersonic Flight Experiment

B. Reimann

German Aerospace Center (DLR), Germany

Speaker: *Bodo Reimann*

Since 2005 research scientist in the Institute of Aerodynamics and Flow Technology at German Aerospace Center DLR in Braunschweig. Doctor of mechanical engineering from University of Duisburg-Essen Master in physics from University of Göttingen.

Synopsis: In the presented work the separation between the HEXAFly-INT high speed glider and the support module is studied numerically. The numerical simulation of the separation process has been carried out by a strong coupling of a Computational Fluid Dynamics (CFD) with a Rigid Body Dynamics (RBD) solver.

hisst-2018_1480920

Effect of Roughness of Bluntness Nose on the Laminar-turbulent Transition at High Mach Numbers

P. Polivanov, Yu. Gromyko, D. Bountin, A. Maslov

Institute of Theoretical & Applied Mechanics SB RAS, Russia

Speaker: *Pavel Polivanov*

Ph.D. (Title: Experimental Study of Unsteady Effects in Shock Wave / Turbulent Boundary Layer) — Institute

of Theoretical & Applied Mechanics, 2011. B.S., M.S. (Engineering Aerodynamics) — Novosibirsk State Technical University, 2004, 2006).

Synopsis: The paper presents data of the effect of the distributed and single roughness of the blunted nose of the cone on the position of the laminar-turbulent transition and the development of perturbations in the boundary layer at high Mach numbers.

hisst-2018_41001129

Influence of Angle of Attack on Hypersonic Wake Flow Structure of a Sharp Cone

Zhi Chen, Liang Zhang, Qingqing Zhang

China Academy of Aerospace Aerodynamics, China

Speaker: *Zhi Chen*

Chen Zhi received PhD in Fluid Mechanics from Beijing University of Aeronautics and Astronautics in 2011. At present, he is working at China Academy of Aerospace Aerodynamics as a senior engineer and the main research area is aerothermodynamics.

Synopsis: The hypersonic wake flow structure of a sharp cone with different angle of attack was investigated numerically. A sharp cone with the same half angle of attack as the Reentry-F experiment vehicle was used for simulation with the same inflow condition except the angle of attack. The flow fields with 0°, 1°, 2°, 5°, 10° and 15° angle of attack were obtained, and the wave and vortex structure are analyzed.

hisst-2018_2010873

Drag Reduction of Hypersonic Spiked Blunt Body with Sideward Jets

Guilai Han, Zonglin Jiang

Institute of Mechanics, Chinese Academy of Sciences, China

Speaker: *Guilai Han*

Synopsis:

hisst-2018_2830937

Effects of the Lift-to-drag Ratio on Climbing Characteristics of Reusable Launch Vehicles

Cui Kai, Xu Yingzhou, Li Guangli, Xiao Yao, Wang

Haixiang

Institute of Mechanics, Chinese Academy of Sciences, China

Speaker: *Cui Kai*

Synopsis:

hisst-2018_38501137

Computation of Hypersonic Flows on Compression Corner using Modified k- ω Model

Amjad A. Pasha, Khalid A. Juhany

King Abdulaziz University, Saudi Arabia

Speaker: *Khalid A. Juhany*

Synopsis:

hisst-2018_2460966

Reentry Blackout Simulation using CFD Combined with Radio Transmission Calculation

Hu Ning

PKU, China

Speaker: *Hu Ning*

Dr. Hu comes from China Academy of Aerospace Aerodynamics.

Synopsis: Multi-component flow field and radio blackout effects during the RAM C-II reentry flight are investigated using chemical non-equilibrium Navier-Stokes equation and two electromagnetic-wave propagation methods, the WKB and Finite Difference Time Domain (FDTD) methods, for L-, S-, C- and X-bands. FDTD method gives good predictions to radio attenuation and hence to blackout altitude while the WKB prediction of the onset of blackout is earlier than FDTD and flight test results.

● **Hypersonic Fundamentals and History**

hisst-2018_1200959

Asymptotic Analysis of Steady Secondary Flow in a Turbulent Boundary Layer

V. Zametaev, A. Gorbushin

Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: *Vladimir Zametaev*

PhD, specialist in asymptotic analysis of separated flows past bodies. Current sphere of interests is the theory of turbulent boundary and shear layers.

Synopsis: Turbulent boundary layer of a viscous incompressible fluid past a flat plate is studied. To analyze the problem, the method of multiple scales was applied, which allowed to find and investigate the steady secondary flow inside the turbulent boundary layer. At that, self-induced entrainment of fluid from the external flow is the main flow in this case, which ensures the supply of kinetic energy from the maximum speed zone to the turbulence generation zone near the streamlined wall.

hisst-2018_47601548

Starting and Heating of Rectangular Hypersonic Inlet with Blunted Leading Edges

V. Borovoy, V. Mosharov, A. Skuratov, V. Radchenko

Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: *Volf Borovoy*

Synopsis:

hisst-2018_34501037

Numerical Study of Wave Trains in High-speed Boundary Layer over a Cone

A. Novikov

Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: *Andrey Novikov*

Andrey Novikov (13 July 1980)

PhD at MIPT, 2007

Affiliation: 1) TsAGI, Department of Hypersonic Aerodynamics and Fundamental Research, head of subdepartment; 2) MIPT, part-time associate professor.

Synopsis: DNS of 3D wave trains in a boundary layer over 7-deg half-angle sharp cone at the freestream $M = 5.95$ are carried out. The Navier–Stokes equations are integrated using the in-house HFlow solver. Unsteady disturbances are imposed via a local actuator, they form 3D wave trains that grow downstream and ultimately exhibit nonlinear breakdown. The results are compared with the experiments at ITAM SB RAS and good agreement is shown. Such simulations help to investigate laminar-turbulent transition mechanisms.

hisst-2018_1300827

Compressibility and Temperature Effects on Turbulent Spot Growth

J. Van den Eynde, J. Steelant

European Space Agency, Netherlands

Speaker: *Jeroen Van den Eynde*

Jeroen Van den Eynde is an Aerothermodynamics Engineer in the Flight Vehicles & Aerothermodynamics Engineering section at the European Space Agency. His research interests include hypersonics and transition to turbulence.

Synopsis: A two-equation correlation-based transition model is presented to predict the onset and development of the laminar-turbulent transition process for boundary layers. It uses one equation for the intermittency transport, and another for the transport of a transition onset criterion. It uses some elements from the Langtry-Menter intermittency-based transition model, but introduces a physics-based rationale for the intermittency production and destruction.

hisst-2018_11401090

New Kinetic Models in Non-equilibrium Aerodynamic Problems

E. Kustova, E. Nagnibeda

St. Petersburg State University, Russia

Speaker: *Elena Kustova*

Synopsis:

hisst-2018_35101153

Mathematical Modeling and Computational Simulation of Supersonic Twophase Gas-particle Flows over Bodies: Possibilities and Limitations

Yu. Tsirkunov, D. Romanyuk, A. Verevkin

Baltic State Technical University, Russia

Speaker: *Yury Tsirkunov*

Synopsis:

hisst-2018_660805

Analytic Model of a Resistive Magnetohydrodynamic Shock

Roland P.H. Berton

ONERA, France

Speaker: *Roland Berton*

Roland Berton graduated from the “Ecole Centrale des Arts et Manufactures” in 1978 and received a PhD in Astrophysics in 1982. Since 1987 he has been working as a research engineer at ONERA on the modelling of physical systems related to atmospheric flight.

Synopsis: The present work is an extension of a former model of hypersonic MHD shock with finite conductivity, when the Hall effect is included. Jump conditions at a plane oblique shock are first derived. Then a shock fitting procedure is worked out by coupling these MHD jumps with thermodynamic correlations and an electric conductivity model. We put into evidence the reduction and saturation of the MHD interaction by the Hall effect as the magnetic field increases, and the crucial role played by the ion slip factor.

hisst-2018_47801549

Interaction of Oblique Shock Wave with the Bow Wave in the Presence of Underlying Plate

V. Borovoy, V. Mosharov, V. Radchenko, A. Skuratov

Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: *Vladimir Radchenko*

Senior Scientist of TsAGI. His main research interests are concentrated on Pressure and Temperature Sensitive Paints methods development and their application in aerodynamic experiments.

Synopsis: An experimental study of the interaction of shock waves near a cylinder perpendicular to a blunt-edged plate was carried out. The experiments were made in the Ludwig wind tunnel at Mach number 5 and different Reynolds numbers. The heat fluxes to the model surface, measured using Temperature Sensitive Paint (TSP), were analyzed. The influence of the plate blunting radius and the distance of cylindrical obstacle from plate leading edge on the gas flow are studied.

hisst-2018_12301201

Experimental Study of Origin of Turbulence and Laminar-turbulent Transition in Inhomogeneous Supersonic Boundary Layers

A. Kosinov

Institute of Theoretical and Applied Mechanics

SB RAS, Russia

Speaker: *Alexander Kosinov*

Synopsis:

hisst-2018_17401155

On Effective Implementation of Block LU-SGS Scheme on Hybrid Unstructured Grid for Hypersonic Flow

X. Li, X. Wang, Z. Shi, Y. Zhang

Institute of Mechanics, Chinese Academy of Science, China

Speaker: *Xudong Li*

Synopsis:

hisst-2018_32101141

The Nonlinear Multi-physics Coupling of Airframe-propulsion Integration for the Air-breathing Launch Vehicle

Bing Chen, Chun-lin Gong, Jian-jun Gou, Dan Chen,

Liang-xian Gu

Northwestern Polytechnical University, China

Speaker: *Bing Chen*

Synopsis:

hisst-2018_36501072

Parametric Investigation of the Front Section of an Aircraft for Optical Purposes

M. Ledyankin, A. Batrakov, S. Mikhaylov
KNRTU-KAI n.a. A.N. Tupolev, Russia

Speaker: Maxim Ledyankin

Synopsis:

hisst-2018_18401076

Interaction of Free and Bow Shock Waves with Local Gas Inhomogeneities

O. Sutyryn, V. Levin
Institute of Mechanics of MSU; Central Aerohydrodynamic Institute (TsAGI), Russia
P.Yu. Georgievskiy
Institute of Mechanics Lomonosov Moscow State University, Institute of Mechanics of MSU, Russia

Speaker: Oleg Sutyryn

Institute of Mechanics of Lomonosov Moscow State University, Senior Researcher.

Synopsis: Interaction of free shocks waves and bow shocks ahead of blunt bodies with elliptical gas bubbles is studied numerically using two-dimensional axisymmetrical Euler's equations. Two distinct flow types — internal and external shock refraction patterns — are observed depending on flow parameters for both light and heavy bubble cases. For each case, shock focusing and cumulation process features and their effect on local force loads on the body are shown to depend on shock Mach number, bubb.

hisst-2018_3280998

A Simple Extending Strategy for TENO Scheme: Scalar Equation and Euler Equations

Fan Zhang, Chunguang Xu
Sun Yat-sen University, China
Jun Liu
Dalian University of Technology, China

Speaker: Fan Zhang

Graduated in Dalian University of Technology, and attained his Ph.D. in Computational Mechanics. Current-

ly, he is working at Sun Yat-sen University, P.R.China, developing high-order shock-capturing schemes.

Synopsis: A simple extending strategy is presented to improve the efficiency and accuracy of the state-of-the-art high order TENO schemes. The presented method applies the smoothness measurement of TENO to detect the position of discontinuity and then uses a polynomial selection procedure to directly apply spatial reconstruction of high-order accuracy, without crossing any discontinuity. Especially, neighboring grid points contained in smooth stencils is also applied in spatial reconstruction.

hisst-2018_1170817

Dynamical Detonation Stabilization of Supersonic Combustible Mixtures in Expanding Channels

Xiaodong Cai, Jianhan Liang, Zhiyong Lin
National University of Defense Technology, China
Ralf Deiterding
University of Southampton, United Kingdom

Speaker: Xiaodong Cai

Synopsis:

hisst-2018_1400830

Asymptotic Theory of the Viscous Transonic Gas Flow

A. Bogdanov
Lomonosov Moscow State University, Russia

Speaker: Andrey Bogdanov

Synopsis:

● **Materials and Structures**

hisst-2018_310812

Preliminary Design of a Hooded Fairing Accommodating Winged Payloads

J. Steelant, A. Jasko, J. van den Eynde, M. Appolloni
ESA-ESTEC, Netherlands
J.F. A. Martos
ESA-ESTEC, Institute for Advanced Studies, Division of Aerothermodynamics and Hypersonics, Brazil
A. Kallenbach
German Aerospace Center (DLR), Germany
A. Shardin, A. Gorskiy
Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: Johan Steelant

Johan Steelant graduated in 1989 (University of Ghent) as mechanical Engineer, in 1990 from the University of Brussels as aerospace engineer. He got his PhD on turbulence and transition modelling at the University of Ghent. Presently working at ESA-ESTEC.

Synopsis: To accommodate the protruding wing tips and control surfaces under the fairing of a sounding rocket, a hooded fairing is proposed. This particular fairing configuration opens up the possibility to accommodate larger dimensions of flight test vehicles otherwise limited by the finite wing span.

hisst-2018_1911571

Experimental Investigation of Thermo-barrier Coating Based on Zirconium Dioxide

K. Zhirikhin, A. Shardin, S. Kazhichkin, A. Nikulenko, V. Talyzin, E. Dmitriev, A. Sysoev, D. Somov, Yu. Tarasenko
Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: Kirill Zhirikhin

Date of birth: 25.05.1984.
Education: 2001—2007 studied at Moscow Aviation Institute (specialist).
Work: 2007—present at Central Aerohydrodynamic Institute (TsAGI).

Synopsis: One of the main problems in design and manufacture of a high-speed civil vehicles, an aerodynamic models or an experimental facility equipment,

subjected to withstand a high-temperature loads, is a combination of optimal choice of construction materials and methods of their protection against the destructive influence of high temperatures. The thermo-barrier coating is selected in terms of its structural compatibility with used materials, required protective and mechanical characteristics.

hisst-2018_1760854

Structural Topology Optimisation of the HEXAFly-INT Vertical Fin

D.J. Munk, G.A. Vio, D. Verstraete
The University of Sydney, Australia
J. Steelant, V.F. Villace
ESA-ESTEC, Netherlands

Speaker: David Munk

David Munk is a doctoral candidate at the University of Sydney working on topology optimisation for aerospace applications.

Synopsis: The highly complex, transient, multi-physics environment of hypersonic aircraft has not yet seen the application of topology optimisation. Therefore, in this study, the internal structure of the vertical fins for the High-speed Experimental Fly vehicles — International (HEXAFly-INT) ESA led project, developing an experimental hypersonic transport aircraft, is designed using a novel discrete topology optimisation algorithm.

hisst-2018_28601101

Ultra-high Temperature Ceramics: Developments for Hypersonic Applications

J.-F. Justin, A. Julian-Jankowiak, V. Guérineau, V. Mathivet
ONERA / DMAS, Université Paris-Saclay, France

Speaker: Jean-François Justin

Research engineer graduated from the "Conservatoire National des Arts et Métiers". At ONERA within the Materials and Structures Department. Ceramic and CMC for functional applications (combustion chambers, stealth materials, propulsion components ...).

Synopsis: Ultra-high Temperature Ceramics are good candidates to fulfil the harsh requirements of hypersonic applications. At Onera, UHTC monolithic and composite materials have been investigated as well as several processing methods. This paper presents the work carried out on these materials. Several aspects are mentioned: manufacturing, mechanical properties, microstructure, oxidation resistance, assessment of several prototypes in realistic environment (arc-jet tests, uncooled injectors in ramjet combustor)...

hisst-2018_1090835

Sparse Locally Linear Embedding for Modal Identification

Wei Guan, L. L. Dong
Xi'an Jiaotong University, China

Speaker: *Wei Guan*

Wei Guan received his M.S. degree (2016) in Computer science and technology from Huaqiao University. Now he is a PhD Candidate in School of Aerospace, Xi'an Jiaotong University. His interests include Machine learning and Structural dynamics of aircraft.

Synopsis: In order to address false modal parameters identification caused by the uncertainty of the selection of adjacent points in manifold learning, a novel modal identification method for structural dynamics using sparse Locally Linear Embedding (LLE) method is proposed.

hisst-2018_540926

Time-domain Dynamic Response Prediction: from One Boundary Condition to Another

Jiaming Zhou, Longlei Dong, Guirong Yan
Xi'an Jiaotong University, China

Speaker: *Jiaming Zhou*

JM Zhou is currently pursuing the Ph.D. degree in Aeronautical and Astronautical Science and Technology at Xi'an Jiaotong University, China. His research interests include comprehensive mechanical environment simulation & prediction, and machine learning.

Synopsis: In this paper, a new approach is proposed by using Recurrent Neural Networks (RNNs) combined

the Gated Recurrent Unit (GRU) to predict the dynamic responses of the same structure under different boundary conditions in the time domain. The method is validated on different structures: a three-degree-of-freedom system and a thin plate. The predicted results illustrate that this method has good learning and data prediction ability for stationary and non-stationary time sequences with 20% noise.

hisst-2018_2090907

Structural Design of High-speed Vehicle with Topology Optimization

Tong Gao, Lei Tang, Zhiguang Zhao, Longlong Song, Xueying Qiu, Dihuan Wu
Northwestern Polytechnical University, China
Guanghui Shi, Qianying Zhou, Dongliang Quan
Beijing Aerospace Technology Institute, China

Speaker: *Tong Gao*

Synopsis:

hisst-2018_990964

Determination of Thermophysical Properties for Short Fibers Reinforced Phenolic Composite and its Thermal Behaviour under Kerosene/Air Flame

G. Dugast, K. Chetehouna, N. Gascoin, M. Bouchez, J.L. Marceau
MBDA — INSA Centre Val de Loire, France

Speaker: *Guillaume Dugast*

PhD candidate at INSA Centre Val de Loire Research Engineer at MBDA.

Synopsis: Silicone-based composites material found a large use in the aerospace industry to protect wall structures from severe heating. To determine experimentally the thermo-physical properties and the kinetic triplet from ambient temperature to 1000°C, dedicated experimental apparatus are used. Finally, the measured data has been implemented in a finite element 1D approach, showing the efficiency of the generic silicone-based composite as a thermal barrier.

hisst-2018_590798

Experimental and Numerical Investigation on Startup of Leading-edge-shaped Heat Pipes

Chen Siyuan, Ai Bangcheng, Han Haitao, Hu Longfei, Chu Min, Chen Liang
China Academy of Aerospace Aerodynamics, China

Speaker: *Chen Siyuan*

Chen Siyuan is serving as a senior engineer in China Academy of Aerospace Aerodynamics. He is engaged in hypersonic vehicle aerodynamic and thermal protection. He completed his master degree at Beihang University in 2008.

● **Missions and Vehicles**

hisst-2018_1130816

Assessment of VTVL and VTHL Reusable First Stages

L. Bussler, I. Dietlein, E. Dumont, M. Sippel, S. Stappert, J. Wilken
German Aerospace Center (DLR) Institute of Space Systems, Germany

Speaker: *Leonid Bussler*

Leonid Bussler — Space Launcher Systems Analysis (SART) — DLR Institute of Space Systems, Bremen. Since 2015: Scientific staff in SART department at DLR Institute of Space Systems, Bremen. 2012 — 2015: Controller Spacecraft Operations, SES.

Synopsis: Two-stage vertical take-off vertical landing (VTVL) and vertical take-off horizontal landing (VTHL) partially reusable launcher configurations are systematically analyzed. The investigated configurations consider a reusable first stage that either performs a landing at the launch site (return to launch site RTLS) or a landing downrange of the launch site (downrange landing DRL). The considered propellant combinations include LOX/LH2, LOX/LCH4 and LOX/RP-1.

Synopsis: Experimental researches on the heat pipe startup character are conducted. The ground tests prove the start-up property and good isothermal performance of the wedge-shaped high-temperature heat pipe. It is revealed that the charging amount of the alkali metal is one of the key factors affecting the startup characteristics of wedge-shaped heat pipes. The start-up performance prediction method of wedge-shaped heat pipes is established, and the feasibility is verified by comparison with the experimental results.

hisst-2018_1280822

SPACE RIDER: Mission Analysis and Flight Mechanics of the Future European Reusable Space Transportation System

G. De Zaiacomo, D. Bonetti, G. Blanco Arnao, G. Medici
Deimos Space S.L.U., Spain

Speaker: *Gabriele Zaiacomo*

Senior Engineer in the Atmospheric Flight Competence Centre at the Flight Systems B.U. at DEIMOS Space, with 11 years' experience in Mission Analysis and GNC for atmospheric flight, including flight mechanics, re-entry systems, and entry guidance.

Synopsis: This paper presents the Space Rider Mission Analysis activities carried out during the phase A/B1 of the Space Rider program in support to the system design, including assessment of the orbital scenarios, definition of re-entry opportunities, computation of the End-to-End reference trajectories, sizing trajectories for subsystems specifications, characterization of the Entry Corridor, feasible domain and trimline design, flying qualities, trajectory performance assessment, and visibility and safety analyses.

hisst-2018_1870857

Preliminary Aerodynamic Design of a Reusable Booster Flight Experiment

C. Merrem, V. Wartemann, Th. Eggers

German Aerospace Center (DLR), Institute of Aerodynamics and Flow Technology, Germany

Speaker: *Clemens Merrem*

Master of Science in Aerospace Engineering at Technical University Brunswick since 2015: Scientist at DLR, Institute of Aerodynamics and Flow Technology, Department Spacecraft, Workfield: CFD simulations and aerodynamic configuration design.

Synopsis: The Reusable Flight Experiment (ReFEx) is an experimental which simulates the reentry of a winged reusable booster stage. The topic covered is the aerodynamic design via CFD simulations. The goal is to create an aerodynamically stable and controllable configuration along the entire reentry trajectory. It is scheduled to fly late 2021.

hisst-2018_1280821

EXOMARS 2020 Entry Descent and Landing Mission Analysis Verification

G. De Zaiacomo, D. Bonetti, I. Pontijas Fuentes, G. Blanco Arnao

Deimos Space S.L.U., Spain

F. Calantropio

Thales Alenia Space, Italy

L. Lorenzoni

European Space Agency, Netherlands

Speaker: *Gabriele Zaiacomo*

Senior Engineer in the Atmospheric Flight Competence Centre at the Flight Systems B.U. at DEIMOS Space, with 11 years' experience in Mission Analysis and GNC for atmospheric flight, including flight mechanics, re-entry systems, and entry guidance.

Synopsis: This paper focuses on the Entry, Descent and Landing (EDL) Mission Analysis verification activities of the ESA/Roscosmos ExoMars 2020 mission, presenting the activities performed by DEIMOS Space in the programme Phase C to support the EDL Critical

Design Review (CDR) in strict collaboration with Thales Alenia Space.

hisst-2018_3101064

Flight Testing Designs in HEXAFLY-INT for High-speed Transportation

J. Steelant, HXI-team

ESA-ESTEC, Netherlands

Speaker: *Johan Steelant*

Johan Steelant graduated in 1989 (University of Ghent) as mechanical Engineer, in 1990 from the University of Brussels as aerospace engineer. He got his PhD on turbulence and transition modelling at the University of Ghent. Presently working at ESA-ESTEC.

Synopsis: The overall aim of the European Community (EC) co-funded HEXAFLY-INT international project with partners from Europe, Russian Federation and Australia is to design, manufacture and flight test a high-speed vehicle. The present paper described the status of the project.

hisst-2018_42601154

Multidisciplinary Design and Flight Test of the HEXAFLY-INT Experimental Flight Vehicle

S. Di Benedetto, M.P. Di Donato, A. Rispoli, G. Pezzella,

R. Scigliano, F. Nebula, D. Cristillo, L. Vecchione

CIRA, Italy

S. Cardone

TET, Italy

J. Steelant, V. Villace

ESA-ESTEC, Netherlands

Speaker: *Sara Benedetto*

Synopsis: The main technical challenges of the FP7 HEXAFLY-INT project are specifically related with the design of the vehicle gliding configuration and the complexity of integrating breakthrough technologies with standard aeronautical technologies, e.g. high temperature protection system and airframe cold structures. This paper will provide a comprehensive and detailed description of the multidisciplinary activities performed by CIRA and TET to design the EFTV and its experimental flight trajectory.

hisst-2018_940809

Design of Gravity-assist Trajectories for Thrust Pinch in an Integrated Aircraft-propulsion System

Jialin Zheng, Juntao Chang, Daren Yu

School of Energy Science and Engineering, China

Speaker: *Jialin Zheng*

Citizenship: Chinese Education: Ph.D candidate Research Interests: System analysis and control design of supersonic/hypersonic propulsion system.

Synopsis: An alternative proposal is put forward to solve the transition thrust pinch issue in a turbine-based combined cycle engine via trajectory optimization.

hisst-2018_1580839

Technical Progress of Multiple-mission Reusable Launch Vehicle SpaceLiner

M. Sippel, S. Stappert, L. Bussler, S. Forbes-Spyratos

German Aerospace Center (DLR), Germany

Speaker: *Martin Sippel*

Dr. Martin Sippel Head of DLR (German Aerospace Centre)'s Space Launcher Systems Analysis (SART) in the Institute for Space Systems (Bremen).

Synopsis: The SpaceLiner ultra-high-speed rocket-propelled passenger transport is in Phase A conceptual design. The critical separation of the passenger cabin and rescue capsule and its subsystems are one topic of the paper. The separation process is critically investigated taking into account multi-body dynamics and advanced CFD-simulations. Potential intercontinental flight routes, considering range-safety and sonic boom constraints as well as good reachability from major business centers, are evaluated.

hisst-2018_1900861

Reusable Aerospace System of Horizontal Takeoff for Orbital Injection and Intercontinental Flight

S. Mikhalyov, V. Buzuluk

Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: *Semyon Mikhalyov*

Semyon graduated from Moscow Institute of Physics and Technology, department Aeromechanics and

Flying Engineering. He started his work at Central Aerohydrodynamic institute 6 years ago, being engaged in aircraft conceptual design and optimization.

Synopsis:

hisst-2018_36401055

Hyplane: Sub-orbital Easy and Common Access

G. Russo, R. Savino, D. Pisanti, M. Saviano, F. Perrelli

Center for Near Space, TRANS-TECH srl, Italy

Speaker: *Gennaro Russo*

Synopsis:

hisst-2018_600969

Combined Approach to Aerodynamic Shape Optimization

N. Ageev, A. Pavlenko

Central Aerohydrodynamic Institute (TsAGI), Moscow

Institute of Physics and Technology, Russia

Speaker: *Nikita Ageev*

Born in 1990, Rostov-on-Don, Russia. Graduated Moscow Institute of Physics and Technology with bachelor (2011) and master (2013) degree with honors. Work in TsAGI since October 2009.

Synopsis: At the present time two main approaches to aerodynamic shape optimization may be distinguished. The first approach requires only direct calculations. The second one expects the availability of tools for the evaluation of the constraint and objective function gradients. The first approach is robust and has opportunities for the topological optimization. The second one allows to operate with large number of design variables. To achieve high aerodynamic efficiency, it is proposed to combine these approaches.

hisst-2018_15901025

A Multi-Objective Optimization for the Aerodynamic Configuration of a Re-entry Vehicle based on MOEA/D

Yi Li, Su Cao, Shuo Tang

Northwestern Polytechnical University, China

Speaker: *Yi Li*

Mr. Yi Li is an assistant Professor at Northwestern Polytechnical University (NPU), China. He received the Master Degree in 2009 from NPU and the PhD in 2015 from Technical University Braunschweig.

Synopsis: The aerodynamic optimization of a wave-rider derived re-entry vehicle is presented. The wave-rider has the advantage of high lift-to-drag ratio. A Multi-objective Evolutionary Algorithm Based on Decomposition is applied for the multi-objective optimization. A suboptimal aerodynamic configuration is obtained which meets the requirements of lift-to-drag ratio, volume and stability.

hisst-2018_39801107

Multi-disciplinary Design and Optimisation of a Minimum Scale Hypersonic Flight Demonstrator

R. Wuilbercq, J. Y. Andro, L. Serre, A. Tremolet

ONERA, France

Speaker: *H. Taguchi*

Japan Aerospace Exploration Agency (JAXA), Japan

Synopsis: Romain Wuilbercq

Synopsis:

hisst-2018_40801128

Research Methods for Electric Actuator Characteristics of High-speed Unmanned Aerial Vehicle in Aeroservoelasticity Tasks

S. Parafes, I. Turkin

Moscow Aviation Institute, Russia

Speaker: *Sergey Parafes*

Synopsis:

hisst-2018_1280823

Mars Sample Return: Entry Descent and Landing Analyses for Architecture Assessment Study

G. De Zaiacomo, I. Pontijas Fuentes, S. Centuori,

P. Hermosín

Deimos Space S.L.U., Spain

H. Johnson

MDA Corporations, Canada

Speaker: *Gabriele Zaiacomo*

Senior Engineer in the Atmospheric Flight Competence Centre at the Flight Systems B.U. at DEIMOS Space, with 11 years' experience in Mission Analysis and GNC for atmospheric flight, including flight mechanics, re-entry systems, and entry guidance.

Synopsis: The paper presents the Earth return Entry Descent and Landing analysis carried out to support the Mars Sample Return Architecture Assessment Study, lead by DEIMOS Space under ESA contract. The EDL mission analysis, based on a robust methodology for the design of the EDL phase in case of high energy entry scenarios, included Entry Corridor analysis for different Earth return scenarios and preliminary EDL mission performance assessment.

hisst-2018_34301048

On the Concept of Cleaning Near-Earth Space from Space Debris using the Re-entry Vehicles with Aerodynamic Braking Systems

A. Medvedskiy, O. Alifanov, V. Kul'kov, V. Terentyev,

S. Firsyuk

Moscow Aviation Institute, Russia

V. Finchenko

S&P Association n.a. S. A. Lavochkin, Russia

Speaker: *Alexandr Medvedskiy*

● **Operation and Environment**

hisst-2018_21101120

Modeling of Sonic Boom Phenomena

T. Kiseleva, A. Kosinov, Yu. Ermolaev, V. Volkov

Khristianovich Institute of Theoretical and Applied Mechanics, SB RAS, Russia

Speaker: *Tatiana Kiseleva*

Synopsis:

hisst-2018_810923

Numerical Simulation Assistant Design of the Near-field Sonic Boom Signature Measurement System for AVIC ARI's FL-60 Wind Tunnel

Qian Zhansen, Leng Yan, Liu Zhongchen

AVIC Aerodynamics Research Institute, China

Speaker: *Qian Zhansen*

Dr. Qian Zhansen jointed AVIC Aerodynamics Research Institute (ARI) in 2011. His main research includes aerodynamic design and optimization, high-order and high resolution CFD numerical schemes, and turbulence/transition models for high speed flows.

Synopsis: In the present paper, we present the design of the near-field sonic boom signature measurement system for AVIC ARI's FL-60 wind tunnel. Most of the design works are by virtue of CFD numerical analysis, and the hybrid mesh with a combination of tetrahedral and hexahedral grid is utilized with mesh adaptive strategy to improve the grid resolution. A rail pressure measurement equipment is used in the present work to instead of the traditional pressure probe to improve the measurement.

hisst-2018_43401176

Noise Reduction using Optimal Takeoff Thrust Management for Supersonic Business Jet

A. Mirzoyan

Central Institute of Aviation Motors (CIAM), Russia

Speaker: *Artur Mirzoyan*

Synopsis:

hisst-2018_24701065

HyCost: A Life Cycle Cost Estimation Tool for Hypersonic Transportation System

R. Fusaro, V. Vercella, D. Ferretto, N. Viola

Politecnico di Torino, Italy

V.F. Villace, J. Steelant

ESA-ESTEC, Netherlands

Speaker: *Roberta Fusaro*

Dr. Roberta Fusaro is Assistant Professor at Politecnico di Torino. Her main research activities are related to Systems and Subsystems conceptual design with special focus on high-speed transportation systems.

Synopsis: This paper aims at presenting an innovative tool developed by Politecnico di Torino to support the designer in cost estimation during conceptual and preliminary design phases, allowing the evaluation of Research, Development, Test and Evaluation Costs (RDTE costs), Production (Prod costs) as well as Direct and Indirect Operating Costs (DOC and IOC).

hisst-2018_10801022

Dynamic Airspace Sectorization to Enable Flight Centric Operations

M. Schultz, A. Temme, I. Gerdes

German Aerospace Center (DLR), Germany

Speaker: *Michael Schultz*

Dr. Michael Schultz is the Head of Air Transportation Department at German Aerospace Center (DLR e.V.).

Synopsis: To efficiently provide air navigation services for today's and future airspace users, we introduce a dynamic airspace sectorisation. Our approach covers operational, economic and ecological constraints under both nominal and dynamic air traffic flow conditions. We consequently changed the outdated paradigm 'flow follows structure' to an innovative approach of 'structure follows flow'. In this way, we will contribute to a future flight-centric air traffic management.

hisst-2018_24701082

Towards Future LH2 Productive Scenarios

R. Fusaro, V. Vercella, D. Ferretto, N. Viola
Politecnico di Torino, Italy
V.F. Villace, J. Steelant
ESA-ESTEC, Netherlands

Speaker: Roberta Fusaro

Dr. Roberta Fusaro is Assistant Professor at Politecnico di Torino. Her main research activities are related to Systems and Subsystems conceptual design with special focus on high-speed transportation systems.

Synopsis: Considering that the expenses related to fuel can reach up to the 90% of the overall Direct Operating Costs, this represents one of the most relevant cost items of the overall Life Cycle Cost. For this reason, this paper suggests a methodology to assess the impact of the LH2 price on DOC for a hypersonic point-to-point mission.

hisst-2018_1660844

Integration and Evaluation of the Impact of Space Vehicle Operations in the European ATM

T. Luchkova, S. Kaltenhäuser, N. Klay, M. Schultz
German Aerospace Center (DLR), Germany
R.B.R. Ang
Nanyang Technological University, Singapore

Speaker: Tanja Luchkova

Holds a degree in Air Traffic Engineering and Transport and have been with DLR since 2007. The main work generally focuses on ATM operational development studies including improvement and validation of new operational requirements, methods and procedures.

Synopsis: Space flight activities are becoming an eminent part of flight operations in the world today. Launch and re-entry operations are expected to grow beyond state use and research purposes into a commercial space transportation business. That creates an evident need to integrate space vehicle operations into the existing air traffic management system in a safe and efficient way.

● **Propulsion Systems and Components**

hisst-2018_11101019

Design, Numerical Analysis and Experimental Studies of Model High-speed Propane Combustion Chamber

V. Vlasenko, V. Sabelnikov, M. Ivankin, S. Molev, A. Nikolayev, V. Talyzin, A. Chevagin
Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: Vladimir Vlasenko

Synopsis:

hisst-2018_40101115

HEXAFly-INT Facility Module Testing in High-Entalpy Flow

N. Kukshinov, V. Aleksandrov, A. Prokhorov, A. Rudinskiy
Central Institute of Aviation Motors (CIAM), Russia

Speaker: Nikolay Kukshinov

Synopsis:

hisst-2018_41801146

Modelling of Heat Transfer in Rocket Combustion Chambers using Eddy-dissipation Combustion Model

V. Zhukov
Institute of Space Propulsion, German Aerospace Center (DLR), Germany

Speaker: Victor Zhukov

Ph.D., Chemical Physics and Physics of Combustion and Explosion, Moscow Inst. of Physics and Technology, 2005. In 2006–2007 Researcher at National University of Ireland, Galway. Since 2007 Research Associate at German Aerospace Center (DLR-Lampoldshausen).

Synopsis: In the work an extension of the eddy-dissipation model (EDM) is developed in order to simulate turbulent combustion of hydrogen in undiluted oxygen in rocket combustion chambers. The modification of the EDM model allows eliminating of main demerits of the original EDM model. This is achieved by introducing additional parameters, which limit the reaction

rate and depend on the local stoichiometry and temperature. The model is validated against experimental data from three different rocket combustors.

hisst-2018_34401059

Mixing Enhancement of Wall-injected Fuel in Supersonic Flow by Spark Discharge

A. Firsov, E. Dolgov, R. Rakhimov, M. Shurupov
Joint Institute for High Temperatures of the Russian Academy of Sciences (JIHT RAS), Russia
S. Leonov
Joint Institute for High Temperatures of the Russian Academy of Sciences (JIHT RAS), Russia; University of Notre Dame, USA

Speaker: Aleksandr Firsov

Synopsis:

hisst-2018_39701105

Coupled Fluid/Solid Numerical Investigation of the Heat Load on a Lobed, Scramjet Strut Injector

P. Gerlinger, Y.-H. Simsont
University of Stuttgart, Institute of Combustion Technology of Aerospace Engineering, Germany

Speaker: Peter Gerlinger

Apl. Prof. Dr.-Ing. Peter Gerlinger PhD from University of Stuttgart, Head of Computer Simulation Group.

Synopsis: The thermal load on a lobed scramjet (supersonic combustion ramjet) strut injector is investigated numerically for Mach 8 flight conditions. For this purpose, coupled 3D RANS (Reynolds Averaged Navier–Stokes) simulations of the supersonic external flow field around the strut injector and the subsonic strut internal hydrogen flow are performed.

hisst-2018_40601123

The Effect of Combustion on the Dynamic Characteristics of the Supersonic Wake Flow

Qing Li, Jianhan Liang

National University of Defense Technology, China

Speaker: *Qing Li*

Synopsis:

hisst-2018_3180980

Experimental Study of Kerosene Combustion Extinguishing and Flame Stability in Supersonic Combustor

Yu Meng, Hongbin Gu, Jingheng Zhuang, Zhanbiao Gao, Huan Lian, Xinyu Chang

University of Chinese Academy of Sciences, Institute of Mechanics, China

Speaker: *Yu Meng*

Doctor student of University of Chinese Academy of Sciences.

Synopsis: In this paper, the experiments of guided hydrogen kerosene under different equivalence ratio conditions under Mach 2.5 conditions were carried out. It was found a stable flame and flameout mechanism for supersonic combustion in this experiment. Shock — flame balance each other.

hisst-2018_700868

Research of Flow Control on Supersonic Inlet Diffuser

Jinsheng Zhang, Huacheng Yuan, Yunfei Wang, Guoping Huang

Nanjing University of Aeronautics and Astronautics, China

Speaker: *Jinsheng Zhang*

PhD student College of Energy and Power Engineering, Nanjing University of Aeronautics and Astronautics, Nanjing People' Republic of China, E-mail: 1021965168@qq.com

Synopsis: Design of a two-dimension variable inlet operating from Mach 0 to 4 was developed in this

paper to meet the specific request. Numerical simulation was carried out to investigate the aerodynamic performance and variable geometric rules of the inlet. In addition, passive control methods were used to improve the performance. The result indicated that the initial inlet basically met the design request over a wide speed range expect Ma3 and Ma3.5. Using geometric modification and suction case could improve inlet.

hisst-2018_1750850

Hysteresis Phenomenon of Shock Train in an Isolator with Incident Shocks

Nan Li, Juntao Chang, Kejing Xu, Wen Bao, Daren Yu
School of Energy Science and Engineering, Academy of Fundamental and Interdisciplinary Sciences, China

Speaker: *Nan Li*

Citizenship: Chinese Education: Ph.D candidate Research Interests: Supersonic/hypersonic inlet; shock wave-boundary layer interactions; shock train; boundary layer separation

Synopsis: The behaviours of the shock train, associated with the separation flow within it, depend on not only the incoming flow conditions but also the characteristics of the boundary layer heavily. The hysteresis characteristic of a shock train in an isolator has been investigated in a direct-connect wind tunnel. The results indicate that with a same pressure ratio, the STLE could be either downstream or upstream of the SWBLI region. The hysteresis behaviour of the shock train was also confirmed.

hisst-2018_42101147

Control of Flow Parameters in the Model of the Pre-chamber Isolator for Ramjet Engine

D. Lapinsky, N. Guryleva, M. Ivankin, A. Tereshin
Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: *Dmitry Lapinsky*

Working as scientist in Propulsion System Aerodynamics department of Central Aerohydrodynamic Institute after graduation from Moscow Institute of Physics and Technology in 2009.

Synopsis: Results of experimental studies of flow in sectioned duct of precombustion diffuser models divided into compartments by longitudinal partitions are presented. It is shown, that the presence of a gas-dynamic connection between the channels reduces the flow irregularity, equalizes the flow parameters at the end of the channel, reduces the longitudinal dimensions of the flow deceleration area.

hisst-2018_1701070

Investigation on the Streamline-Traced Intake Starting

V. Talyzin, A. Fedorov, A. Gubanov, M. Ivankin
Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: *Vadim Talyzin*

Vadim Talyzin is working in position of research associate in the propulsion department of the Central Aerohydrodynamic Institute n.a. prof. N.E. Zhukovsky (TsAGI) since he has graduated from Moscow State Technical University.

Synopsis: Investigation of starting process of the stream-traced intake is presented. It's shown that starting of the intake could significantly correlate with boundary layer state at the compression surface. Results of the experimental investigation of the internal characteristics with different boundary layer tripping devices and vortex generators (and without them) are presented.

hisst-2018_39101097

Investigation of the Features of the Flow Structure in a Multi-channel Supersonic Air Intake Device

D. Rakhmanin, A. Trifonov
Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: *Dmitry Rakhmanin*

D.Rakhmanin@gmail.com. Education: MIPT (Applied physics and mathematics), graduated in 2012. Work experience: junior scientist in TsAGI since 2012 — till present.

Synopsis: Experimental studies of a four-channel air intake device were carried out at Mach number $M = 1.8$ and angle of attack $\alpha = 0$. It is shown

experimentally both non-synchronous throttling of the channels and the difference between the highest and lowest values of the total pressure recovery coefficient in the channels of the air intake device in the area of the angular point of throttle characteristic can reach a significant value.

hisst-2018_2650917

Unsteady Simulation of the Flow in a Hypersonic Airbreathing Vehicle Air Intake during Cowl Opening using a Conservative Overlapping Mesh CFD Technique.

M. Ferrier, P. Grenard
ONERA, France

Speaker: *Marc Ferrier*

Marc Ferrier received his Ph.D. Degree in Fluid Dynamics in 2008 from University of Orléans for his work on boundary layer transition in supersonic flow. He is now a research engineer at ONERA, where he mainly works on scramjets simulations.

Synopsis: An original moving mesh CFD technic has been used to compute the flow around a hypersonic vehicle forebody and into its air intake during the engine cowl opening. This technic computes the intersection between a static background and a moving overlapping mesh at each time step. This ensures a continuity relationship between both meshes and the conservative property of the method. Results of Euler simulations show transient flow during cowl opening. When completely open, the air intake is started.

hisst-2018_35801117

Numerical Investigation of Total Pressure Pulsations in Supersonic Trapezoidal Air Intake using Eddy Resolving DES Method

E. Novogorodtsev
Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: *Egor Novogorodtsev*

Air inlets computational researcher.

Synopsis: As a result of flow compression in shock waves, wall friction, eddy formations and other phenomena, the flow in the inlet duct of the supersonic

air intake becomes nonstationary and dynamic distortion appears. Numerical simulation of unsteady flow was performed using isolated trapezoidal intake configuration equipped with a boundary layer control system on the compression ramp surface.

hisst-2018_1640846

Post-test Analysis of the LAPCAT-II Subscale Scramjet

S. Karl, J. Martinez, K. Hannemann

Germany Aerospace Center (DLR), Germany

Speaker: *Sebastian Karl*

Since 2001: Research Scientist at the Institute of Aerodynamics and Flow Technology of DLR. Development of numerical simulation tools for reacting high-enthalpy flows, plasma flows and combustion.

Synopsis: A Mach 8 subscale scramjet vehicle was designed within the EU-FP7 project Lapcat II. Its purpose was to demonstrate the capability to produce adequate thrust for hypersonic level flight. A test campaign at the HEG shock Tunnel of DLR confirmed precedent CFD predictions of total thrust. Yet, significant differences between CFD analyses and detailed measurements of the pressure distribution inside the combustor could not be resolved. This paper focuses on a further analysis of these discrepancies.

hisst-2018_3000970

Comparison of Air-breathing Jet Engines with Deflagration and Detonation Combustion

A. Kraiko, A. Egoryan

Central Institute of Aviation Motors (CIAM), Russia

Speaker: *Alexander Kraiko*

Author: Doctor of Physical and Mathematical Sciences, Professor A. Kraiko graduated from the Moscow Institute of Physics and Technology (MIPT) in 1959. Head of the Department 704 of the CIAM n. a. P.I. Baranov.

Synopsis: In connection with the allegations of a possible significant increase in thrust characteristics when replacing air-breathing jet engines with deflagration combustion to engines with combustion in detonation waves (PDE and RDE), a comparison of

ramjet engines of different schemes with deflagration and detonation combustion was performed.

hisst-2018_2240912

Hypersonic Hydrocarbon Fuel Vehicle with M = 6+

A. Kuranov, A. Korabelnikov

Hypersonic Systems Research Enterprise, Russia

V. Abashev

Moscow Aviation Institute (MAI), Russia

P. Tretyakov

Institute of Theoretical and Applied Mechanics

SB RAS, Russia

Speaker: *Alexander Kuranov*

Director General / Chief Designer of the Hypersonic Systems Research Enterprise JSC, Leninetz holding company, Professor and Doctor of Engineering.

Synopsis: The main problems of the organization of the working process in the ramjet engine are: providing high combustion efficiency and minimal hydraulic losses, reliability of cooling of high-heat areas using cooling capacity of fuel and ensuring the strength of elements of motor channel. The report examines the principal ways and approaches to solving mentioned problems, their novelty and advantages are proved and compared with traditional methods.

hisst-2018_43401175

Possible Unification of Engines for Advanced Small and Medium Supersonic Civil Aeroplanes

A. Mirzoyan, A. Evstigneev

Central Institute of Aviation Motors (CIAM), Russia

Speaker: *Artur Mirzoyan*

Synopsis:

hisst-2018_27401035

Air-breathing Electric Propulsion for Long-term Flights in Very Low Earth Orbits

A. Filatyev, A. Erofeev, A. Nikiforov, O. Yanova

Central Aerohydrodynamic Institute (TsAGI), Russia

G. Popov, S. Khartov

Moscow Aviation Institute (MAI), Russia

Speaker: *Alexander Filatyev*

In 1973 graduated from the MIPT Dep. of Aeromechanics and Flight Engineering, in 1978 — PhD in Engineering sciences, in 2001 — Grand PhD in Engineering sciences, author of 130 papers on Flight Dynamics, Optimization, Aerospace Vehicle Ascent and Reentry.

Synopsis: Results of solving problems for the practical implementation of the concept of air-breathing electric propulsion (ABEP) using gases of the surrounding atmosphere as a propellant are presented. Conditions for long term existence of spacecraft (SC) with ABEP in low Earth orbits were determined. The possibility of creating a working gas density in ABEP, hundreds of times greater than the density of the environment, is shown. A laboratory model of ABEP thrust unit and optimal control synthesis are presented.

hisst-2018_41601152

Design and Numerical Simulation of a Common Nozzle of Multi-channel, TBCC Engine

Rongqian Chen, Yangcan Huang, Chengxiang Zhu,

Ruofan Qiu, Yancheng You

School of Aerospace Engineering, Xiamen University, China

Speaker: *Rongqian Chen*

Synopsis:

hisst-2018_34401060

Reduction of Power Consumption for Quasi-DC Discharge Applied for Combustion Control in Supersonic Airflow

A. Firsov, E. Dolgov, R. Rakhimov

Joint Institute for High Temperatures of the Russian Academy of Sciences (JIHT RAS), Russia

S. Leonov

Joint Institute for High Temperatures of the Russian Academy of Sciences (JIHT RAS), Russia; University of Notre Dame, USA

Speaker: *Aleksandr Firsov*

Synopsis:

hisst-2018_47001212

Development of the Basis Naphthene Oxidation Kinetic Model for Simulation of the Practical Fuel Combustion

M. Abbasi

German Aerospace Center (DLR), Germany

N.A. Slavinskaya

GRS, Germany

Speaker: *Nadezda Slavinskaya*

Synopsis: A reaction mechanism of cyclohexane (cyC6H12) and n-propylcyclohexane (cyC9H18) is developed to study its oxidation at both low and high temperatures, including PAH precursors routes. Improvements are due to rivaling the main reaction classes, uncertainty boundaries of the rate coefficients. The comparison low-temperature oxidation of both fuels has been performed. It is shown, that unlike cyC6H12 the ignition of n-propylcyclohexane demonstrates negative temperature coefficient (NTC) behavior.

hisst-2018_33601050

Regimes of Turbulent Supersonic Combustion depending on Fuel Temperature

Jeong-Yeol Choi, Hye-Sung Kim

Pusan National University, Korea

Speaker: *Jeong-Yeol Choi*

Ph.D. 1997 Seoul National University Professor of Aerospace Engineering, Pusan National University, 1998 Associate Fellow, AIAA Program Manager(former) of Space R&D, National Research Foundation of Korea Government.

Synopsis: A series of high-resolution numerical study is carried out to understand the effects of fuel temperature the characteristics of supersonic combustion. Constant mass flow rate condition was selected to investigate the effect of fuel temperature on the supersonic turbulent flame. The inflow pressure and Mach numbers were listed for the constant mass flow rate condition at different temperatures. As the fuel temperature increase, it is found that the regime changes to partially premixed to diffusive combustion.

hisst-2018_2380909

Application of Dynamic Adaptive Chemistry and in Situ Adaptive Tabulation for Computationally Efficient Modeling of Supersonic Turbulent Combustion

Jian An, Guoqiang He, Fei Qin, Xianggeng Wei, Duo Zhang

Northwestern Polytechnical University, China

Speaker: *Jian An*

PhD, Northwestern Polytechnical University, P.R. China. Propulsion Theory and Engineering of Aeronautics and Astronautics. Interest: Combustion physics, such as flame structures, heat and mass transfer and combustion modeling.

Synopsis: To deal with the major challenges of combustion simulation with detailed chemical kinetics, dynamic adaptive chemistry (DAC) method and In Situ Adaptive Tabulation (ISAT) method were introduced to accelerate numerical calculation in supersonic turbulent combustion flows. The successful validation

demonstrates that the two proposed methods can be efficiently used in the simulation of supersonic reactive flow for detailed kinetic mechanisms.

hisst-2018_40401144

Effect of Fuel Composition and Post-combustion Chamber Length on Combustion Performance of Paraffin-based Hybrid Rocket Motor

Yi Wu, Zezhong Wang, Xilong Yu, Xin Lin, Fei Li

Institute of Mechanics, Chinese Academy of Sciences, China

Speaker: *Zezhong Wang*

Gener: male PhD student Research Direction: Experimental study of paraffin-based HRE (hybrid rocket engine) State Key Laboratory of High Temperature Gas Dynamics, Institute of Mechanics, CAS.

Synopsis: With H_2O_2 /paraffin-based fuel as the propellant, the effects of fuel composition and post-combustion chamber length on combustion performance of hybrid rocket motor have been experimentally investigated.

hisst-2018_42801161

SABRE Bypass Ramjet Concept Evaluation

C. Bauer, R. Baumann, G. Kurth, R. Schlaps, Ph. Störchle

MBDA-Systems, Germany

Speaker: *Christoph Bauer*

Synopsis:

hisst-2018_920852

Three-dimensional Bump Design for Improving the Starting Characteristics of Hypersonic Inlets

Xiaogang Zheng, Yiqing Li, Yancheng You

Xiamen University, China

Speaker: *Xiaogang Zheng*

Male, Unmarried, Born in January 1994 in Zhejiang Province, China, a student of Professor Yancheng You from School of Aerospace Engineering, Xiamen University.

Synopsis: A three-dimensional bump was generated based on the theory of conical waverider at Mach 6, which was applied to analyse the internal and external flow field as well as the low-speed starting characteristic of hypersonic inlets. The effect of separation control was discussed in detail. And the effect of 3D bump on the lift-drag characteristic of hypersonic inlet was considered as well. The results showed that the designed 3D bumps based on the theory of conical flow can play an effective role in boundary layer.

hisst-2018_2400903

Flow Visualization and Control of Unstarting Scramjet Inlet-Isolator

Kyungrae Kang, Jong Ho Choi, Seong-kyun Im, Seung Jin Song, Hyungrok Do

Seoul National University, South Korea

Speaker: *Kyungrae Kang*

Integrated Ph.D Program Mar. 2016 — present, Seoul National University / Seoul, Republic of Korea, Advisor: Professor Hyungrok Do Bachelor of Science (B.S.) Mar. 2010 — Feb. 2016, Seoul National University / Seoul, Republic of Korea.

Synopsis: Flow visualization using high-speed schlieren imaging of unstarting scramjet inlet-isolator was conducted. Inlet unstart was triggered by excessive nitrogen injection and the unstarting flow was temporally resolved over a rectangular scramjet engine. Boundary layer suction was applied in the isolator wall to examine the effect on the inlet unstart. It was found that with a small portion of mass extraction, early activation can stop while late activation can delay the unstart.

hisst-2018_2870951

Comprehensive Effects of Secondary Heat Release on Ejection and Engine Performance in RBCC Ejector Mode

Pan Hongliang, Ye Jinying

Northwestern Polytechnical University, China

Lin Binbin

Northwestern Polytechnical University, Civil Aviation Flight University of China, China.

Speaker: *Pan Hongliang*

Pan Hongliang, female, she focuses in eaching and scientific research of propulsion system in aerospace and astronautics engineering. The main researches are related to combustion and control in rocket engine and its combined cycles.

Synopsis: In the paper three-dimensional CFD and ground direct-connect experiments have been undertaken to study effects of combustion organization on ejection and engine performance. A steady burning and thermal choke have been realized through pylon and cavity aided combustion organization in a range of 0.4—0.8 kg/s of rocket flow rate at flight Ma2.

hisst-2018_28701121

Study on Ma2-7 Variable Geometry RBCC Performance Via Full Flow Path Simulations

Pan Hongliang, Ye Jinying, Qin Fei, Wang Yajun

Northwestern Polytechnical University, China

Speaker: *Pan Hongliang*

Pan Hongliang, female, she focuses in teaching and scientific research of propulsion system in aerospace and astronautics engineering. The main researches are related to combustion and control in rocket engine and its combined cycles.

Synopsis: This paper aims to study the matching between the combustor and the inlet/exhaust of a variable geometry RBCC engine at low inflow Mach numbers, and also furthermore the paper focus on the feasibility of using a variable geometry combustor to carry out a steady secondary combustion in a pure ramjet mode instead of in a rocket aided ramjet

mode in order to improve the engine performance at low inflow Mach number stage.

hisst-2018_1690847**Numerical Study of Embedded Rocket on Back Pressure Resistance of an RBCC Inlet**

Lei Shi, Haijian Lou, Da Gao, Shuaizhong Wang, Fei Qin, Guoqiang He
Northwestern Polytechnical University, China

Speaker: *Lei Shi*

Lei Shi, borned in 5 Aug. 1986, is now an associate professor in College of Astronautics in Northwestern polytechnical Univeristy. He is majored in airbreathing propulsion and combined cycle propulsion.

Synopsis: Sufficient back pressure resistance of inlet is one of the most important performance requirements for an RBCC engine. Two-dimensional numerical simulations were conducted based on an RBCC inlet model operating at Mach 2.5. The dynamic generation and movement of the shocks in the inlet were simulated under a certain back pressures. The influence rules of the embedded rocket operation conditions and configuration on the maximum back pressure resistance of the RBCC inlet were also numerically investigated.

hisst-2018_33801021**Effect of Direct-reverse Successive Changes of Equivalence Ratios on Transient Combustion in a Scramjet Combustor**

Yue Huang, Binyi Shenwu, Zhenye Luan, Fei Xing, Yancheng You
Xiamen University, China

Speaker: *Yue Huang*

Associate Professor, School of Aerospace Engineering, Xiamen University.

Synopsis: The impact of successive increases and decreases of the equivalence ratios on unsteady characteristics in the transition of combustion modes of a hydrogen-fuelled dual-mode ramjet/scramjet combustor were simulated with DES and finite-rate chemistry model. The present studies were focused on the

transient combustion features, the shock train structure, and movement. The numerical results confirmed the main qualitative findings of the transition of combustion modes and wall pressure oscillation.

hisst-2018_390987**Numerical Investigation on a Free-jet Staged-Combustion Dual-mode Scramjet Combustor**

Fang Chen, Di Lu
Shanghai Jiao Tong University, China

Speaker: *Fang Chen*

Dr. Fang Chen is associate professor at Shanghai Jiao Tong University. His research focuses on combustion and thermal management of propulsion system in hypersonic vehicle.

Synopsis: A generic freejet engine has been explored to find a better way to operate in a wider range. Numerical studies with CFD ++ 2D RANS solver pave the way for the wide-range operation of dual-mode scramjet burners. The basic flow characteristic was analyzed and two major combustion structure were found. The strategies to operate at lower flight Mach number and higher Mach number were proposed.

hisst-2018_37901081**Characteristics on Combustion Mode in Dual Mode Scramjet Engine**

Hyuck-Joon Namkoug
Hyundai Rotem Company, Korea (South)

Speaker: *Hyuck-Joon Namkoug***Synopsis:****hisst-2018_2160876****Pulsation Frequency Management of Thrust Force and Gas Pressure in Nozzles**

A. Khmelevsky, I. Manuylovich
Institute of Mechanics, Lomonosov Moscow State University, Central Aerohydrodynamic Institute (TsAGI), Russia
V. Levin
Institute of Mechanics, Lomonosov Moscow State University, TsAGI, Institute for Automatics and Control Processes FEB RAS, Russia
N. Afonina, V. Gromov
Institute of Mechanics, Lomonosov Moscow State University, Russia
V. Markov
Institute of Mechanics, Lomonosov Moscow State University, Central Aerohydrodynamic Institute (TsAGI), V.A. Steklov Mathematical Institute, Russia

Speaker: *Aleksander Khmelevsky*

The experiments are carried out at the facility of our Institute. Calculations are also obtained on the author's complex of programs for numerical intergration of Navier-Stokes equations.

Synopsis: Complex results in experimental and numerical flow dynamics research and spectra signals of gas pressure pulsations in annular and linear dual slotted nozzles are presented. Experiments are performed in a pulsed aerodynamic facility using acetylene-air mixture combustion products as working gas. Viscous flow calculations are based on the Navier-Stokes equations for multicomponent reactive gaseous medium using single-temperature chemical nonequilibrium model.

hisst-2018_3010983**Experiments on Liquid Kerosene Ignition in a Supersonic Combustor with Various Ignition Assistance Methods**

Inyoung Yang, Kyungjae Lee, Sanghun Lee, Yangji Lee
Korea Aerospace Research Institute, Korea (South)

Speaker: *Inyoung Yang*

Ph. D at Korea Advanced Institute of Science and Technology in 2013. Since 1999, working for Korea Aero-

space Research Institute. Research interests: scramjet intake, supersonic combustor, combined cycle engine.

Synopsis: The ignition characteristics of the liquid kerosene in a model combustor was explored with the assist of atomization, pilot gaseous hydrogen, and fuel heating. The air flow speed was Mach 2.0, air total pressure and temperature were 500 kPa (abs) and 1,100 K. The ignition and flame holding was possible with the help of the hydrogen assist atomization or the pilot hydrogen. Fuel heating up to 170—220°C was also helpful, but not enough for flame holding.

hisst-2018_15101002**Active Flow Control of Wide-envelope Air-breathing Engine Inlet**

Wang Jianlei, Li Tiangang, Wei Zhen, Chen Bing, Gong Chunlin, Gu Liangxian
Northwestern Polytechnical University, China

Speaker: *Wang Jianlei***Synopsis:****hisst-2018_1780869****Micro Cavity Control for Buzz Suppression in Supersonic Inlet**

Ke Dai, Jian Teng, Xiao-Gang Zheng, ian-Feng Zhu, Yan-Cheng You
Xiamen University, China

Speaker: *Ke Dai*

Master Student, Department of Flight Vehicle, Xiamen University, People's Republic of China Research Field: Supersonic Propulsion Technology.

Synopsis: In this paper, buzz phenomenon of a typical supersonic inlet is analyzed using unsteady RANS simulation and proper orthogonal decomposition (POD) method. On the basis of POD results, a one-dimensional (1D) model, which approximates the original flow field, is proposed by taking into account only the first-order POD mode. It is believed that the model proposed here can serve as a good candidate for quick and onboard analysis of the complicated inlet buzz phenomenon.

hisst-2018_58201625

The High-speed Cruise Ramjet Hydrogen Demonstrator for Hypersonic Flight Velocities

E. Son

Moscow Institute of Physics and Technology, Joint Institute for High Temperature RAS, Russia

V. Degtyar, V. Khlybov, S. Kalashnikov

FRC by Makeev, Russia

A. Prokhorov, K. Arefiev, V. Alexandrov, O. Guskov

Moscow Institute of Physics and Technology, Central Institute of Aviation Motors (CIAM), Russia

R. Sidorov

Central Institute of Aviation Motors (CIAM), Russia

K. Son

Moscow Institute of Physics and Technology, Russia

Speaker: *Eduard Son*

Synopsis:

hisst-2018_9801058

Study of Detonation Waves by Means of Mathematical Modeling

V. Levin, I. Manuylovich, V. Markov

Lomonosov Moscow State University, Institute of Mechanics MSU, Russia

Speaker: *Vladimir Levin*

Synopsis:

hisst-2018_33401015

Stabilization and Control of Detonation in Supersonic Gas Flow in Plane Channel

T.A. Zhuravskaya

Institute of Mechanics MSU, Lomonosov Moscow State University, Central Aerohydrodynamic Institute (TsAGI), Russia

V.A. Levin

Institute of Mechanics, Lomonosov Moscow State University, Central Aerohydrodynamic Institute (TsAGI), Institute for Automatics and Control Processes FEB RAS, Russia

Speaker: *Tatiana Zhuravskaya*

Using a detailed kinetic model of chemical interaction, detonation stabilization in a hydrogen-air mixture flowing at a supersonic velocity into a plane channel with constriction and possibility of control of detonation location in the flow were studied.

Synopsis: Using a detailed kinetic model of chemical interaction, detonation stabilization in a stoichiometric hydrogen-air mixture flowing at a supersonic velocity into a symmetric plane channel with constriction the outflow section of which exceeds the inflow one, and possibility of control of stabilized detonation location in the flow have been studied. Several methods of control of detonation location in the flow with purpose of thrust increase have been proposed.

hisst-2018_13801027

Two Motion of Freedom Piston Pump Developed for Hypersonic Aircrafts

Lingfeng Wang, Chengjian Pan, Wenqing Shao

Beijing Aerospace Technology Institute, China

Jian Ruan, Sheng Li, Liang Chang

Zhejiang University of Technology, China

Speaker: *Lingfeng Wang*

Education: 2002.9 — 2005.4 Northwestern Polytechnical University, Xi'an China, Master degree, Major: Engine control systems

Experience: 2005.4 — Present Beijing Aerospace Technology Institute, Beijing China, Senior engineer, Research field: Propulsion systems.

Synopsis: The two motion of freedom piston pump has been invented to enhance efficiency, compactness, integration and reduce weight, noise, vibration. This article presents recent developments on piston pumps, particularly on two motion of freedom piston pumps used for hypersonic aircrafts. In this study, the structures and key techniques of this pump are presented briefly. Experimental results show that the performance characteristics of the pump achieve the anticipated aim and suitable for hypersonic aircrafts.

hisst-2018_26001011

On Shock Train Interaction with Combustion Oscillations in a Cavity Flame Holder During Accelerating Experiments

Huan Lian, Hongbin Gu, Lianjie Yue, Xinyu Chang

Institute of Mechanics, China

Speaker: *Huan Lian*

Research Scientist, Institute of Mechanics, Chinese Academy of Sciences.

Synopsis: The combustion oscillation characteristics are investigated in a dual-mode model combustor equipped with cavity flameholders during acceleration experiments. The combustion oscillations are measured by a spark plug sensor at 200 kHz. Nonlinear analysis is performed to evaluate the deterministic and random nature of transient flame dynamics. Strong deterministic behavior is observed for the first time that positively supports further evaluation and development of predictive flame dynamics model.

hisst-2018_2510935

Effect of Suction on a Sort of Supersonic Inlet

Ming Gao, Huacheng Yuan, Tao Yin, Rongwei Guo

Nanjing University of Aeronautics and Astronautics, China

Speaker: *Ming Gao*

Gao Ming, Postgraduate, from Nanjing University of Aeronautics and Astronautics, People's Republic of China; the direction of study is the Inlet and exhaust system for hypersonic vehicle.

Synopsis: The influence of boundary layer suction on the aerodynamic performance of a two-dimensional mixed compression variable geometry inlet was studied. The preliminary calculation results show that the main reason of the inlet's unstaring is the obstruction of throat caused by the smaller area of it. In this paper, the design of the suction scheme is carried out, and the suction is carried out in the severely separated part of the area. The ultimate goal is to design a relatively excellent suction scheme.

hisst-2018_1701068

Experimental Investigation of the Hydrogen Combustion Chamber and its Complement with 2.5D CFD Data

V. Talyzin, V. Vlasenko, O. Voloschenko, M. Ivankin,

A. Nikolaev

Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: *Vadim Talyzin*

Vadim Talyzin is working in position of research associate in the propulsion department of the Central Aerohydrodynamic Institute n.a. prof. N.E. Zhukovsky (TsAGI) since he has graduated from Moscow State Technical University.

Synopsis: Results of the experimental investigation of the hydrogen combustion chamber within the HEXAFly-INT project are presented. Cross-sections of combustor have elliptic sections. Influence of different ways of hydrogen injection on pressure distribution along the combustor walls is studied experimentally. Experimental data are applied to validation of the new 2.5D method that had been proposed recently for approximate numerical simulation of duct flows.

hisst-2018_39501104

Simulation of Pressure Gain Combustion in a Wave Rotor

P. R. Ess

Institute for Combustion Technology, German Aerospace Center (DLR), Germany

Speaker: *Peter Ess*

2007—present: Research Scientist/Engineer at DLR Institute of Combustion Technology
2003—2006: Research Associate at Imperial College University Education in Aerospace Engineering in Stuttgart, Toronto (UTIAS) and Bristol (PhD).

Synopsis: The numerical study of constant volume combustion with associated pressure gain in a wave rotor configuration, specified in the project TREVAP, is presented. A more sophisticated representation of the chemical reactions in the flow is employed than in the established literature for wave rotors. A first understanding of the combustion process and resulting

flow and wave patterns is obtained. The formation of pollutants was found to be significantly influenced by the high temperatures in the wave rotor.

hisst-2018_2430905

Design and Aerodynamic Performance Analysis of a Axisymmetric Variable Geometry Inlet

Yunfei Wang, Huacheng Yuan, Jinsheng Zhang, Zhenggui Zhou

Nanjing University of Aeronautics and Astronautics, China

Speaker: Yunfei Wang

Wang Yunfei, Ph.D student, study in College of Energy and Power Engineering, Nanjing University of Aero-

navics and Astronautics, interested in combined cycle inlet and hypersonic inlet.

Synopsis: To satisfy the demand of combined circle engine, design and aerodynamic performance analysis of an axisymmetric variable geometry inlet was carried out. First, an axisymmetric fixed geometry inlet was designed based on a design condition and analyzed at different Mach number. Second, a variable scheme was designed to satisfy the demand of mass flow rate and ensure the inlet start under different Mach number, Finally, the annular to circle diffuser was studied to achieve better aerodynamic performance.

● Test & Evaluation

hisst-2018_640800

Numerical and Experimental Investigation of Air Flow and Heat Transfer in a Complete Circuit of a Hypersonic Wind Tunnel

S. Drozdov, R. Davletkildev, A. Rtischeva

Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: Sergey Drozdov

Sphere of scientific interests: Aerothermodynamics of aircrafts and space vehicles, hydrodynamics, coherent structures, two-phase flows, transition to the turbulence.

Synopsis: This work presents numerical and experimental investigation of high-enthalpy real air flow structure in the complete circuit of TsAGI T-117 hypersonic wind tunnel with account for heat transfer processes in the air cooler and at wind tunnel walls.

hisst-2018_41101143

Numerical Investigation of High Temperature CO₂-N₂ Flows in a Plasma Wind Tunnel Facility

A. Pudsey, T. Roos, M. Bricalli, H. Ogawa

RMIT University, Australia

J. Garcia-Garrido, Ch. Mundt

Institute for Thermodynamics, Bundeswehr University, Germany

Speaker: Adrian Pudsey

Tim Roos is a PhD student at RMIT University in the field of Hypersonics. BSc in Aerospace engineering from Delft University of Technology. His main research focus is aerospace propulsion systems and aerodynamics.

Synopsis: Recent interest in missions to Mars brings about the necessity for ground based testing of the flow experienced during entry into the Martian atmosphere. Numerical investigations of the addition of N₂ into the flow of an arc-heated plasma wind tunnel with high-enthalpy CO₂ flows are presented. The objective of the study is to improve the numerical prediction of a plasma wind tunnel by considering the effect of adding N₂ to the flow as a diluent.

hisst-2018_1330906

Capability of the X2 Expansion Tube to Generate a High Enthalpy, High Reynolds Number Test Flow

R. Ramesh, R. Morgan, D. Mee

University of Queensland, Australia

Speaker: Ranjini Ramesh

Highly motivated PhD student at University of Queensland's Centre for Hypersonics. Research project involves measuring heat transfer for Martian entry flows using an experimental technique known as infrared thermography.

Synopsis: This paper reports on the development of a high enthalpy, high Reynolds number turbulent flow condition for a representative Mars entry in the X2 expansion tube at the University of Queensland. A point in the trajectory of Mars Science Laboratory after transition to turbulence has been chosen for experimental investigation using the X2 expansion tube. The aim is to use the established flow condition to measure turbulent heat flux at Mars entry conditions using infrared thermography.

hisst-2018_1710851

Development of the Technique of Sonic Boom Experimental Researches

T. Pritulo, S. Chernyshev, A. Ivanov, A. Kiselev,

V. Mosharov, D. Sboev, L. Teperin, V. Yudin

Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: Tatiana Pritulo

Tatiana Mich. Pritulo graduated from the Moscow Institute of Physics and Technology (MIPT) in 1981. In 1984 she has got Ph.D. degree. T.M. Pritulo works at Central Aerodynamic Institute (TsAGI) as a senior scientific researcher since May 2001 up to date.

Synopsis: The possibilities of the experimental-numerical technique development of sonic boom researches at large industrial supersonic TsAGI wind tunnels are analyzed. This technique is based on the disturbed pressure measuring at aircraft model near-field in the wind tunnel test section. Then the obtained data are recalculated for the large distances by using the quasi linear theory. In order to define the pressure

distribution at the model near-field it is proposed the high-informative method used the luminescent.

hisst-2018_31001139

Experimental Determination of Aerodynamic Coefficients of Simple-shaped Bodies Free-flying in Hypersonic Flow

P. M. Seltner, S. Willems, A. Guelhan

German Aerospace Center (DLR), Germany

Speaker: Patrick Seltner

Research scientist in the field of gasdynamics at the German Aerospace Center (DLR) since 2016.

Synopsis: The impact of the flight attitude and the body shape on the aerodynamic behaviour of differently simple-shaped bodies in hypersonic flow fields were studied. Therefore, several series of free-flight tests were conducted in the H2K at the DLR in Cologne by the use of a non-contact stereotracking system. This measuring technique allows to determine the aerodynamic coefficients.

hisst-2018_550801

Aerodynamic Characterization of a Hooded Fairing Accommodating Winged Payloads

J.F.A. Martos, J. Steelant

ESTEC-ESA, Netherlands

R.O. Santos, M.A.S. Minucci, I.S. Rego

Division of Aerothermodynamics and Hypersonics, Institute for Advanced Studies, Brazil

Speaker: João Felipe de Araujo Martos

I'm from Brazil, where I did my Ph.D. in Science and Space Technologies (2017), a Master degree in Mechanical Engineering (2014), a Bachelor's degree in Aerospace Engineering (2013). I have expertise in emphasis aerothermodynamics numerical and experimental.

Synopsis: Flight tests of winged payloads narrow the test vehicle size due to fairing size, rather than a hammerhead fairing which impacts the drag, a hooded fairing is proposed here allowing the wingspan to cross the fairing's periphery. An extensive experimental and numerical aerodynamics analysis

has been performed for the proposed hooded fairing and is presented in this work provides the necessary pressure and thermal loads for a preliminary thermo-structural design.

hisst-2018_40101127

Dynamic Characteristics of the Working Process In Vitiated Heaters of High-Enthalpy Test Rigs
N.V. Kukshinov, V.Yu. Aleksandrov, M.A. Ilchenko
Central Institute of Aviation Motors (CIAM), Russia

Speaker: Nikolay Kukshinov

Synopsis:

hisst-2018_39901110

Calculated-experimental Investigation of the Flow In the Gasdynamic Throttle
V. Zakharov, A. Rudinskii, S. Gusev
Central Institute of Aviation Motors (CIAM), Russia

Speaker: Viacheslav Zakharov

Synopsis:

hisst-2018_2260890

Converging-diverging Nozzles with Constant-radius Centerbody
A.K. Flock, A. Gülhan
German Aerospace Center (DLR), Germany

Speaker: Andreas Flock

Mechanical engineering at Karlsruhe University and Purdue University — PhD at DLR Köln in 2016. Topic: Design and Performance analysis of three-dimensional Scramjet Intakes — Still at DLR working as Research Scientist on Super- and Hypersonics.

Synopsis: Several flow phenomena, such as recirculating wake flows or noise generation, occur in aerodynamic configurations with backward facing steps. In this context subsonic nozzles with constant-radius centerbodies exist, which enable fundamental research of these phenomena for $M < 1$. For the supersonic regime, however, the existing database and knowledge is limited. Therefore, the present work

presents a design approach for a converging-diverging nozzle with constant-radius centerbody.

hisst-2018_640799

Experimental Investigation of Aerothermodynamic Characteristics of “ExoMars” Descent Module at Hypersonic Velocities
S. Drozdov, V. Brazhko, R. Davletkildееv, D. Fyodorov, I. Shemetov
Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: Sergey Drozdov

Sphere of scientific interests: Aerothermodynamics of aircrafts and space vehicles, hydrodynamics, coherent structures, two-phase flows, transition to the turbulence.

Synopsis: Results of experimental investigation of stationary aerodynamic characteristics and heat flux distribution on the surface of DM-18 descent module of “ExoMars” project at hypersonic flow regimes are presented.

hisst-2018_720804

Mixing Characteristics in a Hypersonic Flow around a Transpiration Cooled Flat Plate Model
T. Hermann, M. McGilvray, H. S. Ifti
University of Oxford, United Kingdom

Speaker: Tobias Hermann

Post doctoral research assistant at the hypersonics group of the Oxford Thermofluids Institute.

Synopsis: This paper presents transpiration cooling experiments conducted in the Oxford High Density Tunnel. The flow structure and mixing phenomena between the injected coolant gas and the hypersonic free stream are investigated for a flat plate model. Surface mounted heat flux gauges, pressure sensors Schlieren imaging and pressure sensitive paint are used.

hisst-2018_2330896

Analysis of Porous Materials for Transpiration-Cooled Heat Flux Sensor Development
F. Hufgard, S. Löhle, J. von Wolfersdorf
University of Stuttgart, Germany
J. Steelant
ESA (TEC-MPA), Netherlands

Speaker: Fabian Hufgard

Fabian Hufgard received a Masters degree in Aerospace Engineering at the University of Stuttgart. Currently, he works on his PhD which focuses on the development of a heat flux sensor for high thermal loads using plenum pressure data.

Synopsis: In transpiration cooled environments a measurement of the plenum pressure changes can be used for heat flux determination based on Non-integer System Identification. This paper presents fundamental experiments required for the identification of susceptibilities with respect to thermophysical and fluidmechanical properties. The test setup for two different porous materials (ZrB_2 and C/C) and the resulting pressure impulse responses over varying coolant mass flows are presented, compared and discussed.

hisst-2018_36801066

Experimental Investigation on Flight Test Vehicle Aerodynamics at TsAGI T-116 Wind Tunnel: Powered and Glider Options
A. Gubanov, D. Gusev, V. Yakovleva
Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: Anatoly Gubanov

Ph.D. Works for TsAGI since 1979 after graduation from the Moscow Institute of Physics and Technology MIPT, current position: Head of Department in Aerodynamics Division. Author of more than 80 scientific publications.

Synopsis: The results of experimental investigation on aerodynamics of the two experimental flight test vehicle EFTV options (powered and glider ones) which are under study within the international project HEXAFly-INT are presented. The tests were performed in TsAGI supersonic and hypersonic wind tunnel T-116 at Mach

numbers from 3 to 8. Particular attention is paid to aerodynamic efficiency and trim-ability of the vehicles.

hisst-2018_2650953

Scramjet Testing Methodology with Vitiated Air
M. Ferrier, D. Scherrer
ONERA, France

Speaker: Marc Ferrier

Graduated from Ecole Centrale de Paris Joined ONERA in 1981 Deputy Director of Energetics Dept from 1997 to 2017 In charge of hypersonic propulsion research since 2017 Research topics: droplet combustion, combined cycle propulsion, scramjet design and CFD.

Synopsis: In many scramjet test facilities, air pre-heating is ensured by combustion of hydrogen or a hydrocarbon fuel. For connected pipe test, the main effect of vitiation is an increase of the specific heat which results in a too low effect of combustion on the flow. For free jet test, the reduction of gamma by the vitiation does not allow to respect both the flight conditions and the conditions at the combustor entrance. In addition, condensation of water vapor may occur in the nozzle of a free jet wind tunnel.

hisst-2018_43001166

Methods of the Wall Interference Reduction at Low Supersonic Velocities in the Wind Tunnel
A. Volkova, S. Chernyshev, A. Ivanov, E. Streltsov
Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: Anastasia Volkova

Synopsis:

hisst-2018_31201165

Hypersonic Characterisation of Rarefied Flow Generated in the Oxford Low Density Wind Tunnel
N. L. Donaldson, C. F. Wilson, P. T. Ireland
Oxford Thermofluids Institute, University of Oxford, United Kingdom

Speaker: Nathan Donaldson

Synopsis:

hisst-2018_40101126

Investigation of Dynamic Characteristics of HEXAFLY-INT Facility Module in High-altitude Testing Conditions

N. Kukshinov, V. Aleksandrov, K. Arefyev, M. Ilchenko
Central Institute of Aviation Motors (CIAM), Russia

Speaker: *Nikolay Kukshinov*

Synopsis:

hisst-2018_2190880

Ultra-fast Temperature Sensitive Paint Shock Tunnel Heat Flux Measurements on the Intake of the LAPCAT II Small Scale Flight Experiment Configuration

J. M. Schramm, S. Karl, K. Hannemann
German Aerospace Center (DLR), Germany
H. Ozawa
Tokyo Metropolitan University, Japan

Speaker: *Jan Martinez Schramm*

Synopsis: A subscale flight experiment configuration (SSFE) powered by a Mach 8 scramjet was designed within the European Commission co-funded project LAPCAT II and tested in the High Enthalpy Shock Tunnel Göttingen (HEG) of the German Aerospace Center. To address the laminar to turbulent boundary layer transition process on the intake, additional heat flux experiments are conducted by using an ultra-fast Temperature Sensitive Paint (TSP).

hisst-2018_38401106

Temperature Measurements in a Carbon Dioxide Flow using Laser-Induced Fluorescence

T. Sander, M. Kirschner, Ch. Mundt
Institute for Thermodynamics, Bundeswehr University München, Germany
A.S. Pudsey
RMIT University, Australia

Speaker: *Christian Mundt*

Synopsis: At the Institute of Thermodynamics at the Bundeswehr University Munich an arc-heated plasma

wind tunnel can provide realistic entry conditions into Martian atmosphere. For the thermometry of the flow with an enthalpy of 3.1 MJ/kg and 3.8 MJ/kg a two-photon excitation process of CO molecules is used. Simulated spectra were calculated in advance with a simulation tool. The rotational temperature of CO in a high-temperature flow is evaluated by a correlation automated rotational fitting method.

hisst-2018_38601093

Investigation of Nonequilibrium Heat Exchange and Catalytic Properties

B. Zhestkov, A. Vaganov, I. Senyuev, V. Shtapov, M. Tselunov
Central Aerohydrodynamic Institute (TsAGI), Russia
I. Sakharov
Institute of Mechanics, Moscow State University, Russia

Speaker: *Boris Zhestkov*

Synopsis:

hisst-2018_41701142

The Wind Tunnel Test Method of Airframe-propulsion Integration for Rocket-based Combined Cycle Launch Vehicle

Chun-lin Gong, Bing Chen, Jian-lei Wang, Tian-gang Li, Liang-xian Gu, Shuo Tang
Northwestern Polytechnical University, China

Speaker: *Chunlin Gong*

Synopsis:

hisst-2018_41501173

Sources and Structure of Fluctuations in High Speed Wind Tunnels

V. Lebiga, V. Zinovyev, A. Pak, A. Ivanov, A. Gorbushin
ITAM SB RAS, Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: *Vadim Lebiga*

Synopsis:

hisst-2018_22901047

An Energy-saving Aerodynamic Layout for Large-scale Conventional Hypersonic Wind Tunnel

Tiejin Wang
Institute of Wind Tunnel and Engineering, China

Speaker: *Tiejin Wang*

Synopsis:

hisst-2018_2610913

Three-dimensional Measurements on a Supersonic Jet Flame Based on Tomographic Chemiluminescence

Qingchun Lei, Bing Liu, Yeqing Chi, Jiawei Zheng, Yibin Xia, Wei Fan
Northwestern Polytechnical University, China

Speaker: *Bing Liu*

Synopsis: This work describes an experimental study on a sonic C₂H₄/air diffusion jet flame based on the three-dimensional (3D) measurements at 15 kHz. The 3D measurements are obtained by a combination of the tomographic reconstruction of luminescence field and the fiber-based endoscopes. Key properties of the flame are extracted based on the 3D measurements. The properties include the detailed 3D flame structure and the 3D luminescence distribution. The results show the capabilities and potentials of the presented...

hisst-2018_24501049

Thin Film Heat Transfer Sensor Instrumentation Research and Development at CAAA Impulse Tunnel

Lin Jian, Chen Xing, Wang Dan
China Academy of Aerospace Aerodynamics, China

Speaker: *Lin Jian*

I am currently a senior engineer in the hypersonic wind tunnel laboratory of CAAA, mainly to carry out aerodynamic, aero thermal test and associated pneumatic test technique in the hypersonic wind tunnel.

Synopsis: A range of thin film transfer heat sensor technology has been demonstrated enabling

measurement of transfer heat either individually or in sensor arrays. Multiple methods for design, construction, calibration and testing of thin film platinum resistance temperature detectors (RTDs) are described. The technology research and development ongoing at China Academy of Aerospace Aerodynamics (CAAA) for applications to future launch vehicles, space vehicles, and ground systems is outlined.

hisst-2018_2220894

Study on Sapphire Fiber Optic Sensor for High Temperature

Jingbo Yu, Guojian Kang, Wei Wang, Bo Zhao, Zhan Huang, Xuejun Zhao
China Academy of Aerospace Aerodynamics, China

Speaker: *Jingbo Yu*

Organisation: China Academy of Aerospace Aerodynamics (CAAA)
Address: Yungang west road, Fengtai District, Beijing, China
Email: yujingbo0110@126.com
Research Interests: experimental aerodynamics
Title: engineer.

hisst-2018_1720965

Calibration of a Plate Sensor for Total Heat Transfer into a Surface with a Spatially and Time Varying Heat Flux

J. A. Myrick, M. Keyhani, J. I. Frankel
The University of Tennessee, USA
Speaker: M. Bouchez, F. Falempint
MBDA-France, France

Speaker: *Justin Myrick*

Justin Myrick is a Mechanical Engineering Ph.D. candidate working in the Heat Transfer Laboratory at The University of Tennessee, Knoxville. His research focus is on the estimation of surface thermal conditions using calibrated sensors.

Synopsis: This study presents the calibration and testing of an uncoated and ZrO₂ coated stainless plate sensor used to measure the total surface heat transfer from a heat flux source that varies in space and time. It was demonstrated that an accurate prediction can

be obtained regardless of the spatial distribution of the surface heating, the choice of calibration test data or the measurement noise magnitude in the field test temperature.

hisst-2018_46401203

Aerodynamic Characteristics of Generic Test Models under High-temperature Real-gas Condition In Free-piston Shock Tunnel HIEST

Tanno Hideyuki, Komuro Tomoyuki, Sato Kazuo, Itoh Katsuhiro

JAXA, Kakuda Space Center, Kakuda Miyagi, Japan

Speaker: *Hideyuki Tanno*

Hideyuki Tanno received his Ph.D. degrees in Mechanical Engineering from Tohoku University in 2005. He is a senior researcher in high-enthalpy shock tunnel HIEST. He is currently working on aeroheating of sample re-entry capsules includes Hayabusa.

Synopsis: A series of wind tunnel test campaigns conducted in the HIEST free-piston high-enthalpy shock tunnel were reported. Three-component aerodynamic characteristics (drag, lift and pitching moment) with generic test models; blunted cone, capsule and lifting body, were measured under high-temperature real-gas condition.

hisst-2018_43801200

Current status of the DLR Reusability Flight Experiment — ReFEx

P. Rickmers, W. Bauer, M. Sippel, S. Stappert
German Aerospace Center (DLR), Germany

Speaker: *Peter Rickmers*

2005: Meng. Aerospace Engineering with Astronautics, Kingston University London
2005—2016: Work at the Center of Applied Space Technology and Microgravity (ZARM)
2010: PhD at the University of Bremen
2016—today: ReFEx project manager at DLR.

Synopsis: The Reusability Flight Experiment (ReFEx) is being developed by DLR (German Aerospace Center) to provide flight and design data on, as well as operational experience with, a winged first stage of

a reusable launch vehicle (RLV). The experiment will be launched on a VSB-30 sounding rocket to altitudes and velocities similar to a first staging event and will then attempt an autonomous return flight along a trajectory comparable to a winged first stage RLV.

hisst-2018_36601057

Experimental Study of the Influence of Small Angles of Attack and Bluntness of a Cone on Stabilization of Hypersonic Boundary Layer using a Passive Porous Coating

S. Morozov, S. Lukashevich, A. Shipliyuk

Institute of Theoretical and Applied Mechanics SB RAS, Russia

Speaker: *Sergey Morozov*

Synopsis:

hisst-2018_1620842

Performance and Stability Analysis of a Hypersonic Vehicle for a Low Speed Flight Test Program

T. Bykerk, D. Verstraete

The University of Sydney, Australia

S. Wolf, V. Villace, J. Steelant

ESA-ESTEC, Netherlands

Speaker: *Tamas Bykerk*

PhD student at the University of Sydney, researching the low speed handling qualities of hypersonic vehicles. My specialisation is in experimental aerodynamics and CFD.

Synopsis: This paper evaluates the feasibility of moving onto a low speed flight test program for the HEXAFly-INTERNATIONAL waverider. A modified, scaled model of the aircraft has been built and tested in the University of Sydney 7x5 Low Speed Wind Tunnel to evaluate its static stability and performance. CFD played a supporting role in flow visualisation which was otherwise not possible to achieve through tunnel tests alone.

hisst-2018_29801111

Investigation of the Influence of the Perforated Walls of the T-128 Wind Tunnel on the Aerodynamic Characteristics of the Re-entry Vehicle at Transonic Speed

A. Gorbushin, S. Glazkov, A. Semenov, A. Lidovskiy, A. Podpaskov, G. Troshkov

Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: *Anton Gorbushin*

Anton Gorbushin is working at TsAGI since 1983 after graduating from MIPT. TsAGI post graduated course: 1987—1991. Since 1998 Gorbushin is a head of laboratory (T-128 transonic wind tunnel). Ph.D. — 2009. He is a docent at MIPT since 2011.

Synopsis: The paper is devoted to the study of the influence of wind tunnel perforated walls on the aerodynamic characteristics of the reentry vehicle model and wall boundary layer at transonic speed. An experimental investigations were carried out in the TsAGI transonic wind tunnel T-128. Numerical investigations were performed by solving RANS equations using EWT-TsAGI software. Satisfactory agreement was obtained between the computational and experimental data.

hisst-2018_39201167

Study on the Effect of the Base Area to the Suction Performance in the Supersonic Ejector

S. Hasegawa, K. Tani, T. Kanda

Research Unit IV, JAXA, Chubu University, Japan

Speaker: *Susumu Hasegawa*

Synopsis:

hisst-2018_43101169

Novel Transient Calorimetric Heat Flux Sensor in Hypersonic Ground Experiment

Shizhong Zhang, Jinping Li, Hong Chen, Xiaoyuan Zhang, Hongru Yu

Institute of Mechanics, Chinese Academy of Sciences, China

Speaker: *Shizhong Zhang*

Shizhong Zhang, Male, born in December 1983, working as an engineer at the Institute of Mechanics, Chinese Academy of Sciences, research direction is hypersonic aerodynamic thermal measurement technology.

Synopsis: This paper presents a novel transient calorimetric heat flux sensor using diamond chips to replace the commonly used copper pieces as the calorimetric sheet. The temperature on reverse side of the calorimeter is measured by a thin film thermometer, which greatly improves the output sensitivity of the calorimeter. The experimental results show that the repeatability error of the transient calorimetric heat flux sensor is within 4% and the error of measurement accuracy is within 6%.

hisst-2018_1990866

The Preliminary Application of MHD Power Generation in Arc Heated Test

Ou Dongbin, Chen Lianzhong, Gao He, Zhu Anwen, Liu Lei, Peng Yan, Liu Baolin

China Academy of Aerospace Aerodynamics, China

Speaker: *Ou Dongbin*

The main work is ground test design and analysis. The author has got the bachelor degree at Nanjing University of Science and Technology in 2002 and got the master degree at CAAA in 2005.

Synopsis: The MHD power generation experimental equipment which is based on high temperature inert gas has been built by using arc heater. The equipment has generated electricity successfully. The design of experiment and the composing of equipment are introduced detailedly, while the result is analyzed also. The experiment result shows that one side is the generated electricity power is decided by gas electrical

conductivity, and the other side is CsCO₃ can improve the electrical conductivity of argon gas.

hisst-2018_40901130

Development and Performance Validation of Konkuk University Ludwig Tube (KULT)

Sungmo Yang, Yung Hwan Byun, Soo Hyung Park
Konkuk University, Korea (South)

Speaker: *Sungmo Yang*

Master's Degree, Konkuk University, 2017—Present. Force/moment measurement on free-flying models in a Ludwig Tube Researcher, Korea Advanced Institute of Science and Technology, 2014—2016. Flame holding in a scramjet model using a shock tunnel.

Synopsis: Ground-based test facilities are used to study different aspects of hypersonic flows. Ludwig tube can produce hypersonic flow with high Reynolds number and the run time is longer than that of a shock tunnel. Konkuk University has developed a Ludwig tube, named as Konkuk University Ludwig Tube (KULT). To verify the performance of KULT, shock angle and pressure measurement were performed. The performance of KULT validated through the comparison between the experimental results and the theoretical values.

● **Thermal, Energy and Management Systems**

hisst-2018_15701098

Experimental and Numerical Achievements in High Temperature Management for Hypersonic Flight

H. Böhrk, T. Stäbler, Ch. Dittert, I. Sakraker, D. Prokein
German Aerospace Center (DLR), Germany

Speaker: *Hannah Böhrk*

Dr. Hannah Böhrk, Dept. Space Systems Integration, DLR, Helmholtz Young Investigator's Group "High Temperature Management for Hypersonic Flight".

Synopsis: High Temperature Management focuses on the development of required numerical methods for thermal response for both transpiration and ablation cooling. In order to design thermal protection systems, these developed models and tools require the input of material data. However, temperature management also depends on measurement and a sensor network provides health monitoring of ceramic heat shields. In order to validate the results from models, sensor measurement a portable test cell for in-situ X-ray.

hisst-2018_1770921

Thermal Management of the HEXAFLY-INT Hypersonic Glider

J-Y. Andro
ONERA, France
R. Scigliano
CIRA, Italy
A. Kallenbach
German Aerospace Center (DLR), Germany
J. Steelant
ESA-ESTEC, Netherlands

Speaker: *Jean-Yves Andro*

Master of Engineering in Aeronautics & Astronautics, PhD in Aerodynamics Senior Research Engineer at ONERA: Hypersonic vehicles design, Aerothermodynamics, Thermal Management, Engineering.

Synopsis: This paper presents the design of the Actuation System of the two elevons of the HEXAFLY-INT hypersonic glider. It describes successively the following items: high level functional architecture, GNC requirements, actuation lane design including servo-actuator, CMC torsion bar and elevon. It ends with the preliminary ground tests of the torsion bar.

hisst-2018_24701056

Preliminary Design and Sizing of the Thermal and Energy Management Subsystem for LAPCAT MR2

R. Fusaro, D. Ferretto, V. Vercella, N. Viola
Politecnico di Torino, Italy
V.F. Villace, J. Steelant
ESA-ESTEC, Netherlands

Speaker: *Fusaro Roberta*

Dr. Roberta Fusaro is Assistant Professor at Politecnico di Torino. Her main research activities are related to Systems and Subsystems conceptual design with special focus on high-speed transportation systems.

Synopsis: This paper deals with the preliminary design and sizing of the Thermal and Energy Management Subsystem elaborated by ESA for the LAPCAT MR2 high-speed vehicle. The working principle of this subsystem is based on the exploitation of liquid hydrogen boil-off. This work aims at analyzing the various components which the TEMS consists of, suggesting proper Estimation Relationships (ERs) for mass, volume and power budgets.

hisst-2018_3130978

Numerical Solution of the Problem of Flow and Heat Exchange in Model Chambers of Combustion of High-speed Direct Air-reactor Engines on Hydrogen Fuel

M. Frantsuzov, O. Serpinsky
Central Institute of Aviation Motors (CIAM), Russia

Speaker: *Maksim Frantsuzov*

Synopsis:

hisst-2018_40701135

Velocity Fluctuations Effect on an Air-Methane Flame Blow-off at Low Damkohler Numbers

K. Arefyev, A. Krikunova, V. Panov, K. Fedotova
Central Institute of Aviation Motors (CIAM), Russia

Speaker: *Konstantin Arefyev*

Synopsis:

hisst-2018_9001039

Thermal Protection of the Surface of a High-speed Aircraft from Convective Heat Flow by Gas Blowing

E. Vasilevsky, I. Ezhov, P. Chuvakhov
Central Aerohydrodynamic Institute (TsAGI), Russia

Speaker: *Eduard Vasilevsky*

Synopsis:

hisst-2018_1430831

Statistical Simulation of the Hypersonic Aircraft Pressurized Compartment and Surface Cooling System Thermal State

S. Gusev, V. Nikolaev
S.A. Chaplygin Siberian Aeronautical Research Institute, Russia

Speaker: *Gusev Sergey*

Synopsis:

hisst-2018_2280892

Numerical Assessment of a Transpiration Cooled Wedge with Adapted Permeability

Ch. Dittert, H. Böhrk
German Aerospace Center (DLR), Germany
S. Löhle
University of Stuttgart, Germany

Speaker: *Christian Dittert*

Since 2011 German Aerospace Center (DLR), Research Scientist Development of transpiration-cooled sharp leading edges layout, design and pre-assembly of the thermal protection system for ATV.

Synopsis: This paper presents that transpiration cooling can be effectively used for cooling sharp leading edges as demonstrated during a plasma wind tunnel campaign at the Institute of Space Systems. During this campaign a wedge geometry comparable to a re-entry leading edge with adaptable permeability, was successfully tested at re-entry heat flux conditions with different cooling mass flows rates.

hisst-2018_560883

Large Eddy Simulation of Combustion in Full-scale Kerosene Fueled RBCC Engine

Bing Liu, Guoqiang He, Fei Qin, Duo Zhang, Xiangeng Wei
Northwestern Polytechnical University, China

Speaker: *Bing Liu*

Propulsion Theory and Engineering of Aeronautic School of Astronautics Northwestern Polytechnical University Combustion Physics (flame structure, mass and heat transfer, combustion diagnosis).

Synopsis: In this paper, Large Eddy Simulation (LES) of combustion adopting Partially Stirred Reactor (PaSR) combustion model is performed for a full-scale kerosene fueled RBCC engine. The code is validated against experimental wall pressure, the results are satisfactory. Then, the wall pressure distribution, heat release, area-average Mach number, combustion efficiency and flame structure of the two configurations are studied.

hisst-2018_1270944

Soft-objects based Procedure for Thermal Protection System Modelling of Reusable Launch Vehicles

A. Aprovitola, L. Iuspa, C. Rainone, A. Viviani
Università della Campania "Luigi Vanvitelli", Italy

Speaker: *Andrea Aprovitola*

Andrea Aprovitola works as post-doctoral Research Fellow at Università della Campania "L.Vanvitelli". His current research activities are related to the aerodynamic shape optimization of both lifting, and winged re-entry vehicle using a free-CAD paradigm.

Synopsis: The present paper deals with a modeling procedure of a thermal protection system designed for a conceptual Reusable Launch Vehicle. A novel parametric model based on a scalar field created by a set of soft object primitives, is used to assign an almost arbitrary seamless distribution of insulating materials over the vehicle surface. Applications to different conceptual vehicle configurations of an assigned thickness map, and materials layout show the flexibility of the model.

hisst-2018_370870

The TPS design of a Reusable Launch Vehicle based on Active Cooling

Jian-Jun Gou, Jia-Xin Hu, Chun-Lin Gong, Bing Chen, Liang-Xian Gu
Northwestern Polytechnical University, China

Speaker: *Jian-Jun Gou*

Assistant professor of Northwestern Polytechnical University, Xi'an, China. Research interest: thermal protection / thermal management of flight vehicles.

Synopsis: In this paper, a TPS design method coupling active cooling is developed. A reusable launch vehicle and its typical trajectory is studied.

hisst-2018_1670845

Numerical Study on a Multi-sample Transpiration-cooled Channel Flow

A. Trübsbach, Ch. Kromer, M. Selzer
German Aerospace Center (DLR), Germany

A. Schwab
University of Stuttgart, Germany

Speaker: *Amadeus Trübsbach*

To order the taxi in advanced:

- Hotel reception
- Company Interservice
(web site <http://www.en.renride.ru>)
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Public transport: underground, tram, bus and trolleybus.

For the trip: arrival at the airport — 2 hours in advance for international flights.

Business hours

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Bank hours	Monday to Friday	09:00 to 12:00 and 13:00 to 18:00
Currency exchange booths	Monday to Saturday	All day
Shops	Monday to Saturday	08:00 to 20:00
Restaurants	Monday to Sunday	12:00 to 24:00 (sometimes to 02:00)

Russian Currency

Russian banknotes: 10 RUB, 50 RUB, 100 RUB, 500 RUB, 1 000 RUB, 5 000 RUB.
Coins in use are kopeks : 5, 10, 50 ; and rubles: 1, 2, 5, 10.

Credit cards

American Express, MasterCard, Discover, and Visa are accepted in most hotels, restaurants, and shops.

Insurance. Participants are advised to arrange travel insurance for medical, personal belongings, etc. The Forum organisers do not cover participants against travel, cancellations of bookings or loss/theft of belongings.

First aid

The emergency phone numbers are :

- 01 — Fire assistance
- 02 — Police assistance
- 03 — Medical assistance
- 04 — Emergency gas service
- 112 — Any kind of emergency first aid

Mobile Phone


Both GSM and CDMA standards for cell phones are used in Russia.

Time

The time zone in Moscow is UTC+04.

Tipping

Common tipping rate is about 5—7%.

The background of the page is an abstract graphic consisting of numerous horizontal, wavy lines. The lines are primarily yellow and light blue, creating a sense of motion and depth. The lines vary in length and thickness, and their edges are slightly irregular, giving the overall effect a dynamic, almost liquid appearance. The lines are arranged in a way that suggests a flow or a series of overlapping layers.

Central Aerohydrodynamic Institute
n.a. prof. N.E. Zhukovsky
1, Zhukovsky Str., Zhukovsky
Moscow Region, 140180 Russia
www.tsagi.com