

**INTERNATIONAL SUMMER SCHOOL**  
**ADVANCED MATERIALS AND STRUCTURES IN SPACE VEHICLES**

Jul 3rd – Jul 20th, 2023

Harbin Institute of Technology, Harbin, P.R. China

**GENERAL INFORMATION**

The summer school of Advanced Materials and Structures in Space Vehicles highlights Mechanics, as a basic science, in the development of high-end aerospace technologies. Renowned scholars from Russia, America, Canada, Singapore and China are invited to introduce frontiers in mechanics and interdisciplinary fields, such as materials and astronautics. It offers students an opportunity to inspire interest, to spark innovation, to communicate and strengthen friendship with world-wide scientists and young investigators in mechanics and relevant fields in an international academic community.

**ATTENDANCE REQUIREMENTS**

Undergraduate or graduate attendees with background in mechanics, aerospace engineering, mechanical engineering, materials science, applied mathematics, etc. are welcomed. All participants must have a good command of English. Some courses/lectures will be given in Russian with translation in English.

**COURSES AND LECTURES**

The summer school offers a two-credit program consisting of three courses (code C1-C3), twelve seminar lectures (code L1-L12), and a sixteen-hour group research project. Lecturers and speakers are renowned scientists invited from world-famous universities and research institutes, such as Lomonosov Moscow State University (Russia), Samara State University (Russia), York University (Canada), Dalhousie University (Canada), Kentucky University (USA), National University of Singapore, and Harbin Institute of Technology (China). All experts will also act as instructors for group research projects.

**(1) Courses**

<b>Lecturer</b>	<b>Institution</b>	<b>Topic</b>	<b>Units /code</b>
Prof. V. V. Lyubimov	Samara State University, Russia	The effect of vibrancy and its external stability of unsymmetric space vehicles in atmosphere in the falling process	8 C1

Prof. А.В.Самсонов	Lomonosov Moscow State University, Russia	Dynamics and kinematic stability of multibody systems	8 C2
Prof. А.П.Алексеев	Samara State University, Russia	Design of aircraft structures	8 C3

## (2) Lectures

Speaker	Institution	Topic	Units /code
Prof. В.М. Морозов	Lomonosov Moscow State University, Russia	Kinematic stability analysis of rigid flexible coupled orbiting spacecraft systems	2 L1
Prof. S.A. Chernyakin	Samara State University, Russia	Stability analysis of spacecraft orbit in coupled multi-fields	2 L2
Prof. А.В.Дорошин	Samara State University, Russia	Chaos and regular dynamics of gyro satellites under small perturbations	2 L3
Prof. Chengwei Qiu Dean's Chair Professor, NUS	National University of Singapore	Hybrid, spatiotemporal & topological thermotics	4 L4 L5
Prof. Baowen Li, Member, Academia Europaea	Southern University of Science and Technology	Thermal diode/thermal triode and thermal superstructural materials - the art of thermal control	4 L6 L7
Prof. Jianjun Gu Fellow, Canadian Academy of Engineering	Dalhousie University, Canada	Robots and artificial intelligence	2 L8
Prof. Bakhyt Alipova	University of Kentucky, USA	Compressible CFD: two methodologies for pipe flow of viscous fluids	4 L9 L10
Prof. Jinjun Shan	York University, Canada	Vibration control of flexible systems using input shaping	4 L11 L12

## GROUP RESEARCH PROJECT

Participants will be grouped into teams to collaborate on research projects. Some basic data, digital models and computational tools will be provided. Each team should choose a topic for innovative research with knowledge gained in the courses and lectures. A partial list of areas covered in research projects is as follows: composites structural design and processing, design and control of unmanned aerial vehicles, nonlinear

dynamics and control of flexible trusses and beams, nonlinear dynamics of aerospace engine rotor systems, etc.

**PROGRAM DATES AND TIMES**

	Week 1						Week 2					
Unit	Mon	Tue	Wed	Thur	Fri	Sat	Mon	Tue	Wed	Thur	Fri	Sat
1-2	L1	L2	C2		Research	Tour	C3		L5	L12	Defense	Poster
3-4	L8	L6			Research				L10	Research		
5-6	C1		L4	L3	Research		L7	L9	Research	Defense preparation	Improve	
7-8			L11	Communication	Research		Research		Communication			

**CONTACT INFORMATION**

Please contact Xun Bingzhang at [xunbz@hit.edu.cn](mailto:xunbz@hit.edu.cn)(E-mail).