



MOSCOW AVIATION INSTITUTE
(NATIONAL RESEARCH UNIVERSITY)

July 1-14

SUMMER SCHOOL

Approaches to the development
of high-load aircraft structures using
the example of a wing caisson



WHAT WE TEACH

WE

TEACH

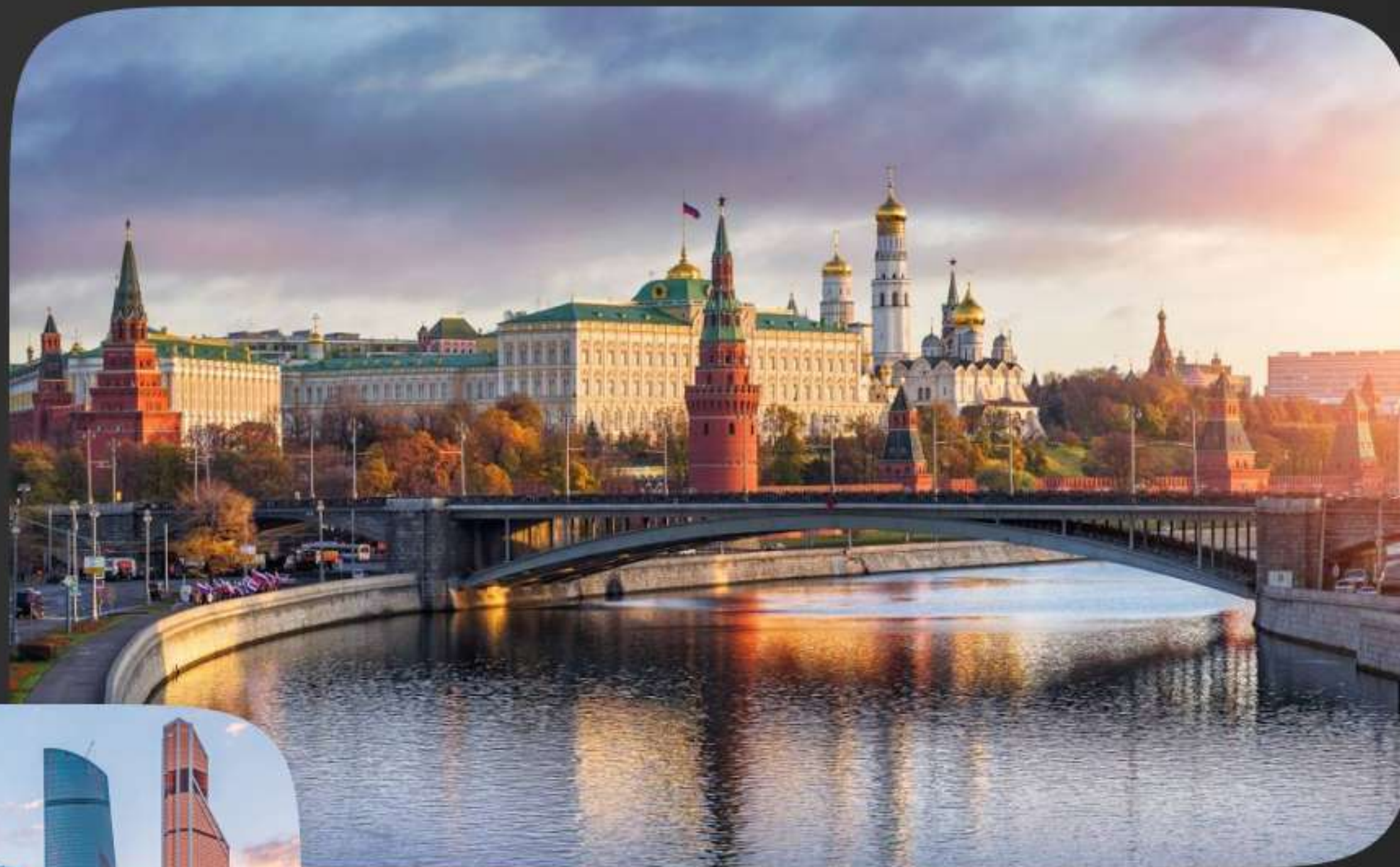
In a modern aircraft, it is the shape and design of the wing that largely determines the effectiveness of the entire aircraft, since it **creates the necessary lift**. Being one of the most loaded parts of the aircraft structure, the most accurate and comprehensive design and testing techniques should be applied to the wing structure.

This **summer school** will allow participants to cover a wide range of topics related to **the design and analysis of aircraft structures using the example of a wing caisson of a civil mainline aircraft**, and gain the necessary skills to work with various tools and techniques in special programs for the comprehensive development and analysis of aircraft structures, both from metals and from PCM.

CITY

Moscow is not just the capital of Russia, but a real center of technology, aerospace research and the future. Become a part of this unique atmosphere where modern technologies are intertwined with a rich history. In addition to an enriching educational program, you will also have the opportunity to immerse yourself in the socio-cultural scene of one of the safest metropolises in Europe.

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MOSCOW

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Moscow Aviation Institute
(National Research University)

MAI

The largest Russian aerospace university that creates technologies that define the shape of the future, prepare teams and leaders of change with more than 90 years' history. Today MAI participates in all industrial aerospace projects being the full participant of the technologies that emerge on the market, including advanced PCM for aerospace.

MODULES

Program is divided into the following 5 modules:

01

MODULE
**INTRODUCTION
TO ENGINEERING**

02

MODULE
**MANUAL DESIGN
OF AIRCRAFT STRUCTURES
FROM POLYMER COMPOSITE MATERIALS**

03

MODULE
**CAD SYSTEM
DESIGN**

04

MODULE
**CAE SYSTEMS
ABAQUS, ALTAIR HYPERMESH**

05

MODULE
**MODULE EXPERIMENTAL PART
OF SUMMER SCHOOL WITH PCM**

MODULE INTRODUCTION TO ENGINEERING

DAY 1

Introduction

4 lessons

Introductory quiz

Aircraft design, Pyramid of computational and experimental studies, overview of areas of aerospace development

Lesson 1

Overview of Aerospace Development Areas

Lesson 2

Introduction to aircraft construction. Overview of the components of an airplane.

Lesson 3 +Quiz

The pyramid of computational and experimental research. Overview of engineering problems using CAE.

Lesson 4

Static and flight testing of units and aircraft.

DAY 3

Materials used in aircraft

Lesson 1

Selecting the material of construction

Lesson 2

Airplane airframe assembly techniques

Manufacturing technology of aircraft products

Lesson 4

Overview of Metal Fabrication Techniques

Lesson 5

Overview of PCM part fabrication techniques

DAY 2

Designing aircraft from metals and polymer composite materials

Lesson 1

Specifics of designing aircrafts made of metals

Lesson 2

Features of designing from PCM

Strength of flight vehicles made of metals and polymer composite materials

Lesson 3

Determining the cross-sectional geometry of the main elements of the wing structure

Lesson 4

Fundamentals of Materials Resistance Course

DAY 4

Features of metal and PCM wing construction

Lesson 1

Purpose of the wing and general wing requirements.

Lesson 2

Wings Structural and Power Schemes. Selection of the structure.

Lesson 3

Designing a wing mechanization structure

Lesson 4

Wing Tests

DAY 5

Mechanics of polymer composite materials

Introduction to micromechanics of PCM

Lesson 1

Ply mechanics of PCM.

Lesson 2

Macromechanics of PCM

Lesson 3

Damage mechanics of PCM. Difference between Continuum and Discrete approaches

Lesson 4

Quiz

DAY 6

Nanoscale fillers. An overview of existing nanofillers. The purpose of introducing modifications

Lesson 1

Additive technologies and materials for them.

Lesson 2

Binders and their role in the formation of PCM properties.

Lesson 3

Fillers and their role in the formation of PCM properties. The main characteristics of binders

Lesson 4

Quiz

MODULE
MANUAL DESIGN
OF AIRCRAFT STRUCTURES
FROM POLYMER COMPOSITE MATERIALS

MODULE
CAD SYSTEM
DESIGN

MODULE
CAE SYSTEMS
ABAQUS, ALTAIR HYPERMESH
ROBUSTNESS OF AGGREGATES, OPTIMIZATION
AND CALCULATIONS IN CAE SYSTEMS

DAY 7

Lesson 1

Selection of the optimal section of stringers shelves

Lesson 2

Selection of optimal lay-up for stringers

Lesson 3

Selection of optimal lay-up for the spar

Lesson 4

Determination of optimal structural strength of wing box

DAY 8

Mastering the basicskills of working with geometry. Modeling a wing caisson in NX

Introduction to the NX System. General Introduction

Lesson 1

Fundamentals of Modeling. Sketches

Lesson 2

Modeling Basic Design Elements

Lesson 3

Assembly

Lesson 4

DAY 9

Creating a finite element model of a wing caisson in Abaqus

Mastering the interface. Creating and assigning properties

Lesson 1

Setting Layouts, Geometry Operations within the Software

Lesson 2

Finite Element Mesh Overlay. Basic operations and software capabilities

Lesson 3

Calculating wing caisson load-bearing capacity in Abaqus static solver

Setting incremental step, boundary conditions and loads

Lesson 1

Calculation, Analyze Calculation

Lesson 2

MODULE

MODULE EXPERIMENTAL PART OF SUMMER SCHOOL WITH PCM

DAY 10

Experimental investigation

Lesson 1

Excursion to the
Aerocomposite
enterprise

Lesson 2

Cutting and laying out dry
carbon fabric structural
panels

Lesson 3

Testing of elementary
samples on a static testing
machine

Lesson 4

Experimental determination of the stiffness
of PC specimens

Final Quiz



TEAM

Dmitry Strelec



Acting Director of the Directorate and Head of Scientific Department of the Institute "Aircraft Engineering", Director of the World-class Scientific Center (Supersound)

Ilya Konstantinov



Head of the educational programs
Senior professor of department 101 "Aircraft design and certification", engineer.

Ekaterina Toropylina



Assistant of department 104 "Technological design and quality management", Leading expert of Aviation corporation "YAKOVLEV"

Sergey Kovtunov



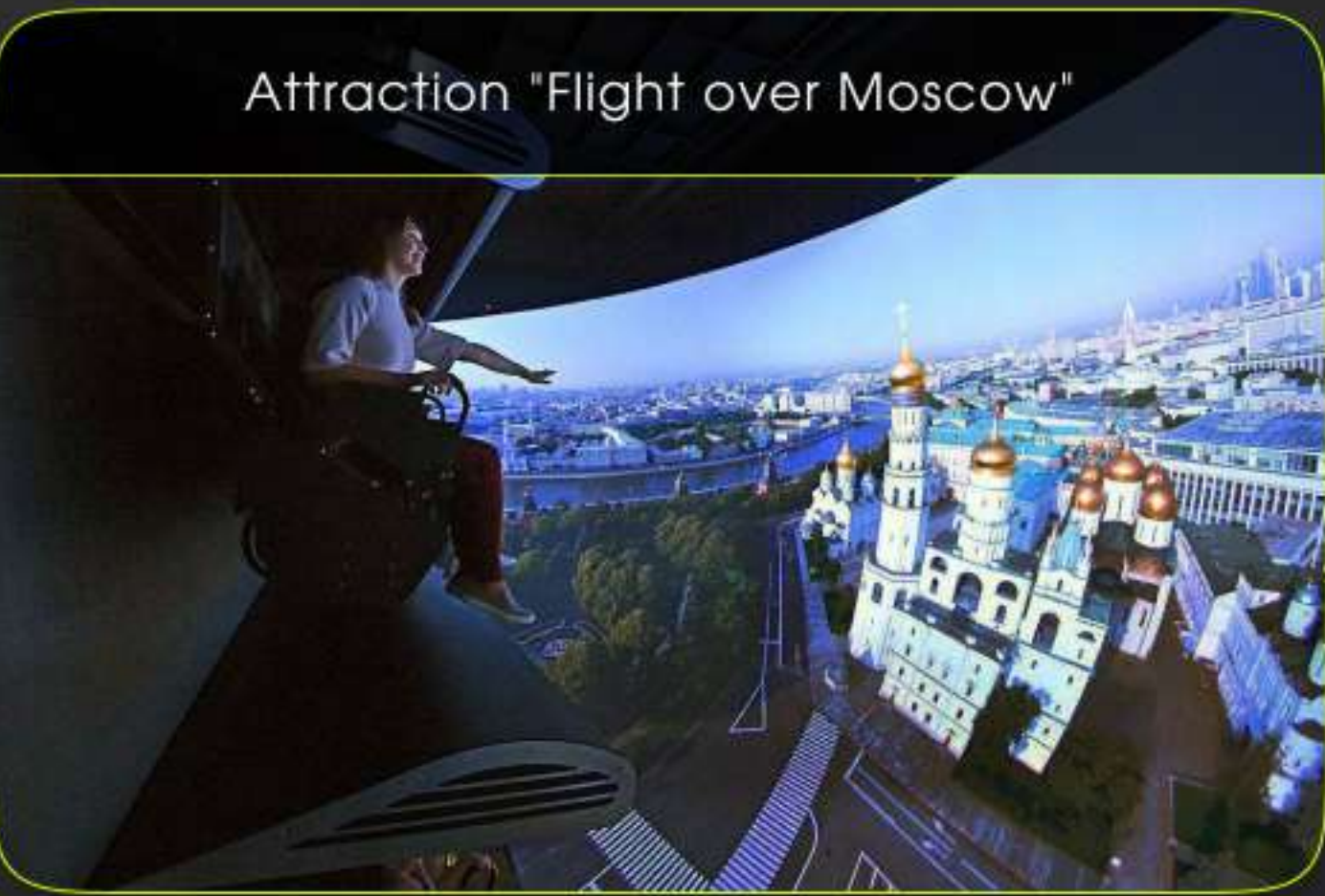
Engineer of the Research Department 101 "Aircraft design and certification"

Isak Akhmedov



Strength engineer and programmer of research department 101 "Aircraft design and certification"

EXTRACURRICULAR ACTIVITIES



Meals, accommodation and transfers are included

INFORMATION

Program cost

1700 \$

Contacts

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SUBMIT YOUR APPLICATION SOON!