

## Logistics/Scientific Secretariat

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The organization of the Course is the responsibility of CIRA having a large experience with international workshops and conferences events.

A moderate fee will be asked to participants for covering the expenses of the course material, bus transportation, lunches and coffee breaks.

### Place

Via Maiorise  
81043 Capua  
Italy

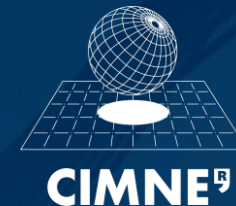
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GRAIN 2



- **CIRA-GRAIN2 OPEN Short Course**
- **Advanced Green Technologies for Reducing Environmental Impacts in Aeronautics**
- **1 – 4 July 2014**
- **CIRA – Italian Aerospace Research Centre**
- **[www.cimne.com/grain2](http://www.cimne.com/grain2)**
- **Capua, Italy**



## Scientific/Technical Committee

### - Propulsion related green technologies:

Pierre Vialettes (Airbus Group Innovations, France)  
DING Shuiting (BUAA, China)  
Herman Deconinck (VKI, Belgium)  
ZHENG YAO (ZJU, China)  
LI Jibao (ACAE, China)

### - Airframe Flight Physics:

Adel Abbas (UPM, Spain)  
ZHAO Ning (NUAA, China)  
Shia-Hui Peng (KTH, Sweden)  
SUN Xiaofeng (BUAA, China)  
Huang Wenchao (ASRI, China)

### - Environmental friendly materials and smart structures:

Maksim Danilov (DLR, Germany)  
YI Xiaosu (BIAM, China)  
Markus Kleineberg (DLR, Germany)  
NIU Wensheng (ACTRI, China)  
QIU Jinhao (NUAA, China)

### - CNS/ATM for greener air transport:

Luc de Nijs (NLR, The Netherlands)  
ZHANG Jun (BUAA, China)  
BAI Jie (CAUC, China)  
WANG Guoqing (CARERI, China)

### EC Scientific Officer is

Dietrich Knoerzer (DG RTD - Aviation) and

### MIT Scientific Officer is

Ms. SHI Jingmin (Consultant)

## The EU-China Research Network in Aeronautics GRAIN2

GRAIN2 - the 2nd phase of the EU-China Greener Aeronautics International Networking - aims to address environmentally friendly technologies in the most relevant area of aeronautics and air transport. GRAIN2 is supported jointly by the European Commission (EC) and by the Ministry of Industry and Information Technology of China (MIIT) within the 7th Research Framework Program.

### Environmental and Future Aspects of Aviation

The continuous increase of global air transport generates an increasing use of hydrocarbon fuel with emission of CO<sub>2</sub> and NO<sub>x</sub> and the formation of contrails that form cirrus clouds.

The aviation sectors world-wide needs to set new and more challenging goals and respond to the future needs over a longer timeframe. Europe's Vision for Aviation «Flight path 2050» was released in 2011. Amongst others it underlines the ambitious need for further significant emissions reductions (- 90 % NO<sub>x</sub>, - 75% CO<sub>2</sub> and - 65% Noise). The same situation from the Chinese side, the first version, the Mid- and Long-Term Development Plan for Aeronautics was published in 2013 in China. As air transport operates globally, these aviation environmental goals are of global nature.

Described in the SRIA Executive Summary of ACARE, Advanced Green Technologies will play a more and more dominant role for achieving the ambitious goals. This approach intends to meet future requirements on emissions and noise reduction, fuel consumption and green/smart materials and structures as well as enhanced air traffic management.

### GRAIN2 Short Course Objectives

The main objective of this Open CIRA-GRAIN2 Short Course will be to provide in-deep information on most relevant technologies and methods for aviation. This will be

delivered by international scientific and technological experts from Europe and China. They are involved in the field of flight physics, aero-acoustics, structures and materials of aircraft and aero-engines, and in air traffic management.

The Course intends to provide the state of the art of the main advanced green technologies for reducing the aviation environmental impact by addressing:

- Propulsion related green technologies: Experimental techniques, aerodynamics transition/separation determination and control in turbomachinery, high lift blades low pressure turbine, new energy for aviation, alternative fuels, fuel certification, energy storage, energy management, multidisciplinary optimization (aerodynamics, mechanics, acoustics), surrogate-assisted design strategies.
- Aircraft flight physics for flow control, drag and noise reduction: Computational Aero-Acoustics (CAA), hybrid CFD/CAA, nonlinear harmonic method, engine and airframe noise, unsteady optimal flow control and gradient-based optimization for noise reduction, review on drag reduction technologies, turbulent boundary layer technologies and innovative configurations for drag reduction.
- Environmentally friendly materials and smart structures: bio-sourced-materials (resin and fibers) and their application, environmentally friendly production, SHM using guided waves and optical sensors, structural life prediction, advanced aluminum alloys, recycling of composite materials.
- Air traffic operations and management including communications, navigation and surveillance CNS: use of big data to improve operations, trajectory based operations, aeronautical communications, sector capacity, navigation, continuous descent approach and avionics.

### Short Course Case Studies

The CIRA GRAIN2 Open Short Course will also address case studies in propulsion/flight physics and aero-acoustics/smart and environmentally friendly materials and structures/CNS/ATM allowing the participants to better understand how to reduce the effects of aircraft/engine design on climate and noise impact as well as on materials waste reduction.

### Who should participate in the Short Course?

This CIRA GRAIN2 Open Short Course has a high educational and training value, especially for young engineers and scientists who work in the field of multi-physics environmental technology applications to aeronautics. But the course is also of interest to senior engineers and technologists that want to update their knowledge. It will provide detailed lecture material to the attendees in English.

### Short Course Directors:

D. Quagliarella (CIRA, Italy), J. Periaux (CIMNE, Spain), GAO Zhenghong (NPU, China), LUO Shilu (CAE, China), SUN Jian (CAE, China), G. Buggeda (CIMNE, Spain)