



«ETTORE MAJORANA» FOUNDATION AND CENTRE FOR SCIENTIFIC CULTURE
TO PAY A PERMANENT TRIBUTE TO GALILEO GALILEI, FOUNDER OF MODERN SCIENCE
AND TO ENRICO FERMI, THE "ITALIAN NAVIGATOR", FATHER OF THE WEAK FORCES



INTERNATIONAL SCHOOL OF MATHEMATICS «GUIDO STAMPACCHIA»

64th Workshop: VARIATIONAL ANALYSIS AND AEROSPACE ENGINEERING III: MATHEMATICAL CHALLENGES FOR THE AEROSPACE OF THE FUTURE

ERICE-SICILY: 28 AUGUST – 5 SEPTEMBER 2015

Sponsored by the: • Italian Ministry of Education, University, and Research • Sicilian Regional Government
• Department of Civil and Industrial Engineering, Pisa University • Hypstair European project • Delft University of Technology • Airbus, Toulouse

PROGRAMME AND LECTURERS

Calculus of Variation
Tensor analysis and algebra
Functional analysis
Dynamical systems
Control theory
Signal analysis
Partial differential equations
Boundary Integral Equations
Galerkin Method
Structural Finite Element Method
Newton-Raphson Algorithm
Gradient-based optimization
Optimization of trajectories in space
Innovative aircraft configurations
Aerodynamics
Acoustics
Computational Fluid Dynamics
Shape Optimization in Aerodynamics
Constitutive equations of materials
Fracture Mechanics
Aeroelasticity
Flight Mechanics
Optimal Control Problems
Propulsion systems
All electric and Hybrid propulsion

- G. ALLAIRE, Polytechnique X Paris, FR
- J. ALONZO, University Stanford, CA, US
- R. ARINA, Politecnico Torino, IT
- M. BALAS, Embry-Riddle Aeron University, Daytona Beach, FL, US
- G. BERNARDINI, Università Roma Tre, IT
- G. CARRIER, Onera Meudon, FR
- R. CAVALLARO, SDSU, San Diego, CA, US

- E. CHAPUT, Airbus Flight Physics, Grenoble, FR
- V. CIPOLLA, Pisa University, IT
- B.A. CONWAY, University of Illinois, Urbana, IL, US
- G. DAL MASO, SISSA Trieste, IT
- C. DAVINI, Università Udine, IT
- A. DE SIMONE, SISSA Trieste, IT
- G. DEL PIERO, Università Ferrara, IT
- L. DEMASI, SDSU, San Diego, CA, US
- E. DUCEAU, Airbus Flight Physics, Grenoble, FR
- A. FREDIANI, Università di Pisa, IT
- F. JOUVE, Université Paris Diderot, FR
- R. KNOPS, Heriot-Watt University, Edinburgh, UK
- G. LA ROCCA, TU, Delft, NL
- J. MARTINS, University Michigan, US
- K. MEASE, University California, Irvine, CA, US
- B. MOHAMMADI, IMAG Montpellier, FR
- G. MONEGATO, Politecnico di Torino, IT
- M. MONTEMURRO, ENSAM, Talence, FR
- B. NAGEL, DLR, Cologne, DE
- G. NOVEMBRINI, Università di Roma Tre, IT
- F. OLIVIERO, Università di Pisa, IT
- O. PIRONNEAU, UPMC, Paris, FR
- P. PODIO-GUIDUGLI, Università di Tor Vergata Roma, IT
- A. QUARTERONI, Politecnico di Milano, IT
- A. RAO, University of Florida, Gainesville, FL, US
- R. RYAN, Georgia Institute of Technology, Atlanta, GE, US
- D. SCHMITT, Technical University of Munich, DE
- J. SHINAR, Israel Institute of Technology, IL
- I. TERRASSE, Airbus Flight Physics, Grenoble, FR
- J. VAN TOOR, University of Hamburg, DE
- P. VANNUCCI, Université de Versailles, FR
- G. VEBLE, University Nova Gorica, SL
- M. VOLSKUJIL, TU, Delft, NL

PURPOSE OF THE WORKSHOP

The collaboration between Aerospace Engineering and Mathematics has been always very fruitful both for engineers and mathematicians, and the International School of Mathematics "Guido Stampacchia" of the Ettore Majorana Foundation and Centre for Scientific Culture, in Erice, is the most appropriate site to meet together. The Workshop aims to bring together both aerospace engineers (from universities, research centres and industry) and mathematicians to discuss about advanced problems needing an extensive application of Mathematics. Some of the most important mathematical methods of analysis in industrial engineering were developed in the Aerospace field. Examples are: Finite element method, Computational Fluid Dynamics, fatigue and crack propagation prediction methods, optimization, optimum controls, hybrid materials, etc. Aerospace Engineering is facing to the challenges of new generation aircraft; new aerodynamic configurations are analysed; public and private increasing economic resources are to be invested. Different propulsion systems, including more electric or hybrid systems, are candidates to renovate aviation of 2020. Significant results will be possible when a consistent progress in Mathematics will be available; Variational Analysis and Optimization are the main subjects in this respect. In the Workshop, the most advanced subject in Engineering and Mathematics will be discussed as, for example: computational fluid dynamics, mathematical optimisation with applications in Aerodynamics; mathematical constitutive characterization of materials and applications to new materials for Aerospace; stability of structures, new materials and composites, fracture mechanics, non linear theories of structures and optimization; new controls, more electric aircraft, hybrid or electric propulsion; space missions and optimization, etc. The Workshop is conceived to capture the interest of people coming from both Academia and Industry and, in particular, of young researchers who could realize what are the new frontiers of Engineering and Mathematics.

The Workshop is dedicated to the memory of prof. Piero Villaggio, a great scientist who honoured the last workshops in Erice with his marvellous lectures.

APPLICATIONS

Persons wishing to attend the Workshop should apply by e-mail to the Co-Director of the Workshop:

- Professor Aldo FREDIANI
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Tel + 39.050.2217265 – Fax + 39.050.2217244
e-mail: a.frediani@ing.unipi.it

They should specify: i) date and place of birth, together with current nationality; ii) affiliation; iii) address, e-mail address.

POETIC TOUCH

According to legend, Erice, son of Venus and Neptune, founded a small town on top of a mountain (750 metres above sea level) more than three thousand years ago. The founder of modern history — i.e. the recording of events in a methodic and chronological sequence as they really happened without reference to mythical causes — the great Thucydides (~500 B.C.), writing about events connected with the conquest of Troy (1183 B.C.) said: «After the fall of Troy some Trojans on their escape from the Achaei arrived in Sicily by boat and as they settled near the border with the Sicanians all together they were named Elymi: their towns were Segesta and Erice.» This inspired Virgil to describe the arrival of the Trojan royal family in Erice and the burial of Anchises, by his son Aeneas, on the coast below Erice. Homer (~1000 B.C.), Theocritus (~300 B.C.), Polybius (~200 B.C.), Virgil (~50 B.C.), Horace (~20 B.C.), and others have celebrated this magnificent spot in Sicily in their poems. During seven centuries (XIII-XIX) the town of Erice was under the leadership of a local oligarchy, whose wisdom assured a long period of cultural development and economic prosperity which in turn gave rise to the many churches, monasteries and private palaces which you see today.

In Erice you can admire the Castle of Venus, the Cyclopean Walls (~800 B.C.) and the Gothic Cathedral (~1300 A.D.). Erice is at present a mixture of ancient and medieval architecture. Other masterpieces of ancient civilization are to be found in the neighbourhood: at Motya (Phoenician), Segesta (Elymian), and Selinunte (Greek). On the Aegadian Islands — theatre of the decisive naval battle of the first Punic War (264-241 B.C.) — suggestive neolithic and paleolithic vestiges are still visible: the grottoes of Favignana, the carvings and murals of Levanzo.

Splendid beaches are to be found at San Vito Lo Capo, Scopello, and Cornino, and a wild and rocky coast around Monte Cofano: all at less than one hour's drive from Erice.

More information about the «Ettore Majorana» Foundation and Centre for Scientific Culture can be found on the WWW at the following address:
<http://www.csem.infn.it>

PLEASE NOTE: Participants must arrive on 28 August, not later than 6 p.m.