Guest editorial

3AF International Conference on Applied Aerodynamics

The 3AF International Conference on Applied Aerodynamics is organized yearly by the French Aeronautics and Astronautics Society (3AF) in a different venue in France known for its activities in the field of aeronautics and/or space technology. The conference is an excellent opportunity for scientific exchanges within the aerospace community where aerodynamicists from the industry, research institutions and academics meet. Scientists and engineers from other fields involving fluid mechanics are also welcome.

Every year the conference addresses a different topic trending in the field of aerodynamics. It is organized on the basis of five half-days of technical presentations, each introduced by a keynote conference given by a highly recognized expert in the field covered during the session. The conference is concluded by a technical visit in connection with the conference subject.

This special issue of the *International Journal of Numerical Methods for Heat & Fluid Flow* presents a selection of articles based on the most instructive contributions to the 51st 3AF International Conference on Applied Aerodynamics (AERO2016) and 52nd 3AF International Conference on Applied Aerodynamics (AERO2017).

In 2016, the conference was hosted by the University of Strasbourg on the subject *Thermal effects and aerodynamics*.

AERO2016 focused on problems involving a strong coupling between heat transfer phenomena and aerodynamics, or more generally fluid dynamics. Such phenomena play a crucial role in a large variety of devices including engines of all kinds, reentry vehicles, electronic components, buildings, air conditioning, etc. Mastering of heat transfer is essential for the design of more efficient vehicles with reduced fuel consumption, hence reducing pollutant emission. This aspect also concerns the design of more economical heating/cooling systems for terrestrial and aerial vehicles, buildings, etc. Heat transfer plays an important role in some flow-control devices involving heat deposition.

Among the numerous aspects of the problem, the following items were considered: convection phenomena, thermal effects in hypersonic flow, heat transfer effect on laminar-turbulent transition, icing, cooling systems, flow control by energy deposition, multi-physics approach, air conditioning for building and vehicles, etc.

In 2017, the conference was hosted by the Ecole Centrale de Lyon on the subject *Progress in Flow Control*.

AERO2017 was an opportunity to focus on recent developments in the flow-control techniques aiming at the development of greener vehicles, more comfortable means of transportation, environmental "friendliness" and sustainability. This involves improvements in aerodynamics performance, thermal control and reduction of fuel consumption and emissions, as well as reduction of other negative impacts on the environment such as noise, wake vortices and soiling. The techniques involved are passive

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and active devices, contouring, energy deposition and morphing, but not limited to the aforementioned. Flow control is present in a large number of applications including aircraft and unmanned aerial vehicles, helicopters, automobiles, trains, ships, wind turbines, missiles, space launchers, turbomachinery, environmental management in buildings, combustion chambers, etc.

Among the many aspects of the problem, the following items were considered: control theories and applications, high speed and internal flows, acoustics, transition and wake control, heat transfer phenomena control, ground vehicles, actuators and sensors, skin friction control, closed loop control and morphing.

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