Guest editorial: turbulent flows in aerodynamics applications

This special issue of the International Journal of Numerical Methods for Heat and Fluid Flow focuses on turbulent flows in aerodynamics applications.

Turbulent flow regimes, compressible or otherwise, are omnipresent in high-Reynolds-number aerodynamic systems. Accurate prediction is required to anticipate and optimise the performance of new concepts. Optimisation is particularly important where the reduction of chemical and noise pollution is concerned. Robustness and safety for real weather and varying environmental conditions is also critical for aeronautical/terrestrial transportation and for renewable-energy industries. These constraints have driven significant progress in the academic and industrial communities in recent years, for instance in the fields of hybrid, large-Eddy simulation and Lattice–Boltzmann approaches for the modelling and analysis of unsteady industrial flows; or in the development of measurement methodologies that are now frequently used in the context of data-driven modelling. New theoretical frameworks have appeared for the description of out-of-equilibrium turbulence, and for the reduction and modelling of coherent structures and their sound radiation. These frameworks provide a foundation for the development of flow-control strategies. The prediction of transition to turbulence in complex flows, particularly important in the aeronautical sector, is also an active domain.

All the articles of this special issue have been examined by the scientific committee of the French Aeronautics and Aerospace Society (3AF). They were then reviewed by at least two independent international experts with the rigorous expertise process of the IJNMHFF journal. Some works are the completed versions of the most instructive contributions to the 55th 3AF International Conference on Applied Aerodynamics AERO2020 + 1. Initially programmed in 2020 at Poitiers (ENSMA, Pprime Institute-CNRS, France) this conference had to be postponed to 2021 due to the pandemic; hence, its denomination AERO2020 + 1, and organized in a virtual form. The 3AF International Conference on Applied Aerodynamics is an annual event organized by the Aerodynamics Technical commitee of the French Aeronautics and Aerospace Society (3AF) at French venues known for their activity in the field of aeronautics and/or aerospace science and technology. The conference is an excellent opportunity for scientific exchange between scientists from industry, research institutions and academia. Scientists and engineers from other fluid-dynamics fields are also welcome.

Abderrahmane Baïri
3AF and Laboratoire Thermique Interfaces Environnement (LTIE EA 4415), Université de Paris, Ville d’Avray, France, and
Bruno Chanetz and Jean Delery
3AF and ONERA, Meudon, France