Flow, Turbulence and Combustion (2020) 104:291–292
https://doi.org/10.1007/s10494-019-00105-0

Progress in Engineering Turbulence Modelling, Simulation and Measurements

Franck Nicoud[1] · Stefan Hickel[2] · Ananias Tomboulides[3] · Wolfgang Rodi[4] · Michael Leschziner[5]

Published online: 20 January 2020

Preface

This Special Issue contains substantially extended and revised versions of 20 papers, selected from a total of 175 papers presented at the 12th Symposium on "Engineering Turbulence Modelling and Measurements" (ETMM-12), held in Montpellier, France, in September 2018, under the auspices of ERCOFTAC. The ETMM series of events was established to give greater prominence and sharper profile to research on application-oriented aspects of turbulence and its computational and experimental characterisation, thus helping to bridge the gap between fundamental approaches to turbulence and the exploitation of models, numerical-solution codes and knowledge in an industrial setting. In this respect, ETMM is thematically closely consonant with the aims and ethos of Flow, Turbulence and Combustion (FTaC).

Within the broad spectrum of topics featuring at ETMM meetings, the majority deal with the computational and experimental approaches to complex aero- and hydro-dynamic flows, multi-phase and reacting flows, flow control, flows in power generation and environmental fluid mechanics. The present Special Issue aspires to reflect this mix and to provide an archival record of some of the best papers presented at ETMM-12. To this end, selected papers were subjected to the same rigorous review process as that followed in respect of any other contribution to FTaC, each manuscript being reviewed by three expert referees, with some manuscripts undergoing two revisions before being accepted.

The 20 papers included in this Special Issue report mostly computational research that falls, broadly, under five major headings:

✉ Franck Nicoud
franck.nicoud@umontpellier.fr

[1] University of Montpellier, Montpellier, France

[2] Delft University of Technology, Delft, The Netherlands

[3] Aristotle University of Thessaloniki, Thessaloniki, Greece

[4] Karlsruhe Institute of Technology, Karlsruhe, Germany

[5] Imperial College London, London, UK

- *turbulent boundary layers*—including the enhancement of heat transfer by free-stream turbulence, the effect of the Froude number on the near-wall flow, and the impact of height and shape of roughness on the flow dynamics;
- *reacting flows*—including the use of DNS to assess the surface area of a hydrogen-air flame, measuring the response of a swirling flame, assessing the effect of the droplets distribution on the performances of a lean injector, and simulating the flashback of a premixed flame;
- *stability and control*—including transitional flow behind a micro-ramp, jet-wake interaction for a dual-bell nozzle and the unstable laminar flow over an aerofoil under buffet conditions;
- *physical modelling*—quantifying the coolant injection over a high-pressure vane and the mass flux in a wall-bounded flow at supercritical pressure, deriving an improved RANS model with the aid of machine learning, and using DNS for the a priori assessment of combustion models;
- *numerical methods*—including the use of high-order methods to study mixing in an internal-combustion engine, the simulation of multi-component mixtures with an efficient representation of the vapor–liquid equilibrium, the assessment of soot-particle size distribution, and massively parallel LES of an actual multistage high-pressure compressor.

The Editors hope that the readers of this Special Issue will judge it to be a valuable contribution to the literature, and to give credit to efforts by the scientific community to engage in turbulence modelling, simulation and measurements of immediate relevance to the industrial arena.

Franck Nicoud, Stefan Hickel, Ananias Tomboulides—Guest Editors
Wolfgang Rodi—Editor
Michael Leschziner—Editor-in-Chief