14th World Congress on Computational Mechanics (WCCM XIV)
8th European Congress on Computational Methods in Applied Science and Engineering (ECCOMAS 2020)
July 19- 24, 2020, Paris, France

ADVANCES IN INTRUSIVE AND NON-INTRUSIVE ORDER REDUCTION TECHNIQUES FOR FLOW ANALYSIS, CONTROL AND OPTIMIZATION

M. FOSSATI[†], A. QUAINI[§] AND G. ROZZA[*]

[†] University of Strathclyde
75 Montrose Street, G1 1XJ, Glasgow, United Kingdom
marco.fossati@strath.ac.uk, https://www.strath.ac.uk

[§] University of Houston
4800 Calhoun Rd, Houston, TX, USA
quaini@math.uh.edu, http://www.uh.edu/nsm/math/

[*] SISSA International School for Advanced Studies,
Via Bonomea 265, 34136 Trieste, Italy
gianluigi.rozza@sissa.it, http://mathlab.sissa.it

Key words: Model Order Reduction, Intrusive and Non-Intrusive Methods, Control, Optimization.

ABSTRACT

Model order reduction techniques allow obtaining fairly accurate solutions in a fast manner by extracting relevant knowledge from a set of available solutions (called snapshots) and using it to recast the original problem in a more compact form where the cost associated to parameterized problems in many-query settings is substantially reduced. This minisymposium will discuss the latest advances in intrusive and non-intrusive Reduced Order Modelling techniques targeting the study of fluid mechanics problems.

Talks are envisioned that will deal with methodological developments in numerical analysis with emphasis on mathematical modelling as well as application in the different contexts of computational engineering. Nonlinear inverse problems, optimal flow control, shape optimization, flow characterization via principal component analysis and uncertainty quantification will be at the core of the discussion. Advanced developments will be presented for applications in multi-physics contexts, such as fluid-structure interaction problems, and more general coupled phenomena involving inviscid, viscous and thermal flows, solids and porous media, incompressible and compressible flow regimes.

The minisymposium will foster discussion on industrial, medical and environmental applications including aeronautical, mechanical, naval, off-shore, geophysical, wind, sport, biomedical engineering and cardiovascular surgery as well, combining elements of high performance computing and advanced reduced order modelling, real time computing, data management and visualization.

The objective of the minisymposium is to present the state of the art in the field of Reduced Order Modelling formulations and implementations while identifying the current challenges and drawing the future landscape.