Digital Twins in Engineering, DTE 2027
March 8-12, 2027, Yokohama, Japan

COMPUTATIONAL AND DATA-BASED APPROACHES TO PREDICTION AND CONTROL FOR TURBULENT FLOW

H. MAMORI[*], K. FUKUDOME[**], Y. NABAE[†] AND T. TSUKAHARA[††]

[*] Department of Mechanical and Intelligent Systems Engineering, The University of Electro-Communications,
1-5-1 Chofugaoka, Chofu, Tokyo, 182-8585, Japan
mamori@uec.ac.jp, www.mamorilab.mi.uec.ac.jp/

[**] Department of Mechanical Engineering, Ritsumeikan University
1-1-1 Nojihigashi, Kusatsu-shi, Shiga 525-8577, Japan
fukudome@fc.ritsumei.ac.jp

[†] Department of Mechanical Systems Engineering, Tokyo Metropolitan University
6-6, Asahigaoka, Hino-shi, Tokyo 191-0065, Japan
nabae-yusuke@tmu.ac.jp

[††] Department of Mechanical and Aerospace Engineering, Tokyo University of Science,
2641 Yamazaki, Noda-shi, Chiba 278-8510, Japan,
tsuka@rs.tus.ac.jp, www.rs.tus.ac.jp/~t2lab/

ABSTRACT

Computational fluid dynamics has become an essential tool for understanding, predicting, and controlling complex flow phenomena in science and engineering. This minisymposium covers state-of-the-art computational and data-based approaches for flow prediction and flow control, including direct numerical simulation, large-eddy simulation, reduced-order modeling, data analysis, data assimilation, system identification, and control-oriented modeling. Topics of interest include, but are not limited to, drag reduction, enhancement of mixing, heat and mass transfer control, multiphysics flow problems, turbulent flow prediction, coherent-structure analysis, optimal and feedback control, and applications to canonical, environmental, biomedical, and industrial flows.

The aim of this minisymposium is to provide a broad forum for researchers working on experimental and computational fluid dynamics, flow control, and data-based analysis to exchange ideas on current progress and future developments in this field. Particular emphasis is placed on discussions that connect physical understanding, predictive modeling, and control-oriented applications. Contributions from students and young researchers are especially welcome, and the minisymposium is intended to encourage active discussion across different methodologies, flow configurations, and application areas.