First International Conference on Emerging Technologies in Computational Science for Industry, Sustainability and Innovation – M2P 2023
May 30th - June 1st , 2023, Taormina, Italy

FAST SCIENTIFIC COMPUTING AND NUMERICAL SIMULATION FOR INDUSTRY

NICOLA DEMO*, ANDREA MARTINI*
AND GIANLUIGI ROZZA*

*mathLab, SISSA
Via Bonomea, 265, Trieste, Italy

{nicola.demo, andrea.martini, gianluigi.rozza}@sissa.it

ABSTRACT

In the field of numerical simulations, accuracy is of course one of the main considered aspects. In the last decades, however, the increasing computational capacity has allowed to control the accuracy of ever more complex models, by providing a larger computational power.

However, in several contexts, a balanced trade-off between the required computational cost and the achieved accuracy is usually prefered, as for example during the optimization of industrial processes or artefacts. Such demand has induced the development of recent techniques to accelerate the computing time for numerical simulations. Reduced order models (ROMs) and scientific machine learning (ML) are two examples of methodologies that have gained a lot of popularity thanks to their capability to reduce the computing time for numerical simulations.

In this session, we aim to collect several applications where the usage of such techniques led to enable new industrial workflows, to accelerate and/or to improve the existing ones, and more in general to reduce the computational cost for numerical simulations. We encourage contributions regarding applications that involve recent methods — that include, but are not limited to, ROMs and ML — to tackle computational bottlenecks in industrial simulations. Contributions from industry, spinoffs and startups are encouraged, but not limited to.

REFERENCES

[1] G. Rozza, M. H. Malik, N. Demo, M. Tezzele, M. Girfoglio, G. Stabile, and A. Mola, "Advances in reduced order methods for parametric industrial problems in computational fluid dynamics", in *Proceedings of the 6th European Conference on Computational Mechanics: Solids, Structures and Coupled Problems, ECCM 2018 and 7th European Conference on Computational Fluid Dynamics, ECFD 2018*, 2020, pp. 59-76.

[2] M. Tezzele, N. Demo, A. Mola, and G. Rozza, "An integrated data-driven computational pipeline with model order reduction for industrial and applied mathematics", in *Novel Mathematics Inspired by Industrial Challenges*, M. Günther and W. Schilders (eds.), Springer International Publishing, 2022.