VII ECCOMAS Young Investigators Conference
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Scientific Machine Learning techniques for complex engineering systems

Scientific area: Computational Applied Mathematics

In recent years, engineering sciences have experienced a data-driven paradigm shift, with the goal of exploiting the increasing amount of available data, while leveraging existing knowledge of the underlying physical phenomena and industrial processes. Scientific Machine Learning unifies machine learning strategies from computer science with physics-based models (e.g., high-fidelity solvers and model order reduction techniques) to construct digital and hybrid twins of complex and large-scale engineering systems.

This minisymposium aims to gather contributions on the most recent challenges in modelling of modern engineering systems, including:

- the development of innovative methods and engineering tools for accurate, efficient and reliable real-time simulations ;
- the application of these methodologies to challenging problems in mechanics, industry 4.0 (e.g., interactive control and optimisation, data-driven manufacturing, smart machines and processes), and sustainable development (e.g., traffic management, smart buildings, precision agriculture).

This minisymposium aims to gather a diverse scientific and technical audience including engineers, mathematicians, computational scientists and physicists to foster cross-dissemination of ideas and transdisciplinary research. This minisymposium will constitute an opportunity to discuss and disseminate state-of-the-art results on model order reduction, machine learning, and data-driven approaches, with particular interest in their integration with mechanistic knowledge, towards interpretable artificial intelligence tools. Applications of interest include direct and inverse problems in science and engineering, spanning from single-physics to multi-physics phenomena.

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