

DATA-DRIVEN REDUCED ORDER MODELLING AND SURROGATES WITH APPLICATIONS IN COMPLEX MULTI-PHYSICS SYSTEMS

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ABSTRACT

Although the idea of building digital twins for complex infrastructure and systems is well established, its realisation remains particularly challenging due to the need to combine advanced computational modelling, data for calibration and sensor integration to obtain models with true predictive value for decision support.

The perspectives of using digital twins for predictive maintenance, operational optimization, and risk analysis are substantial and the potential for impact significant, from safety, planning, and financial points of view. Digital twins rely on mathematical and numerical modelling, reduced order models in combination with machine learning techniques, deep understanding of the underlying physics and the knowledge on the availability of data.

This minisymposium gathers recent contributions on reduced order models and new techniques on how to include data in the simulations as seen from different communities: the exchanges between can lead to innovative ideas that could improve the state of the art both in mathematical methods and engineering practice.