

Solving multiphysics/multiscale problems: a challenge between (reduced) model-driven and data-driven approaches

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Short Description

The need for efficient computational tools in real-life problems triggered different novel approaches based on both model-driven and data-driven paradigms. This is particularly true for complex problems involving different dynamics and different space/time scales. As well known, the interaction of different physical problems (like, e.g., in fluid-structure interaction models) leads to challenging heterogeneous models. Monolithic approaches generally are not an option, yet segregated techniques require efficient numerical methods. Model reduction applied to these computational mechanics/biology methods can provide the key to efficiently solving multiscale/multiphysics engineering problems. On the other hand, the availability of data from experiments or high-fidelity simulation (e.g., DNS) enables machine learning and data-driven techniques to extract knowledge on the underlying dynamics rapidly. In this minisymposium, we aim to gather researchers and experts working in the field of computational mechanics and scientific computing, but also in engineering fields, using the different paradigms to promote an insightful discussion on their pros and cons and the opportunity of coupling them. Talks covering either theoretical aspects or applications (with particular attention to energy and biomedical engineering) are welcome at this event. Organized with the support of NSF Grant DMS-2012286.