**Multi-fidelity methods for uncertainty quantification and optimization**

**Track 4000 (Computational applied math)**

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**ABSTRACT**

Despite many recent advances, accurate uncertainty quantification, design and control can still be infeasible when the cost of obtaining data is high. Fortunately, multi-fidelity approaches have had great success overcoming this challenge by using cheaper and lower accuracy data to extrapolate beyond limited higher cost data. Initial developments in this area have focused on employing data from ordered sets of models that solve governing equations using a hierarchy of numerical discretization levels, for example finite element models with limited different mesh resolutions. Recent work has extended the applicability of multi-fidelity approaches to a larger set of applications by considering more general, potentially unordered, model ensembles that can arise from reduced physics and that can include models with different parameterizations.

Recent progress in method development has resulted in significant advancement on both the algorithmic level (for example leveraging the strengths of deep learning techniques) and the theoretical level (theorems of convergence). These advances have yielded substantial gains across many application areas, including computational mechanics, fluid dynamics, and earth sciences. Moreover, these gains have spanned the spectrum of uncertainty quantification tasks such as for forward and inverse uncertainty quantification, data assimilation, rare events estimation, sensitivity analysis, and optimization under uncertainty.

The aim of this minisymposium is to gather researchers working on multi-fidelity methods in the above-mentioned contexts to share insights and knowledge. Both methodological and application-oriented works are welcome.