

"Advances of Machine Learning in Material Design, Modeling and Processing"

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Recent years, the intelligent model reduction via mathematical, numerical and statistical approaches to reveal the high-dimensional multiscale data in low-dimensional industrial scale has played a crucial role in efficient design of advanced materials, processes, structures and complex mechanical systems. New and exciting developments of intelligent model reduction methods often go beyond classical theories, incorporate more profound physical mechanisms, machine learning techniques, parallel and high performance computing, and are becoming the exclusive numerical tools in addressing the computational challenges which were difficult or impossible to solve by conventional methods. Those new developments are increasingly important in improving safety, quality and productivity for future innovative industrial design and manufacturing.

The goal of this minisymposium is to bring together experts working on these methods, share research results and identify the emergent needs towards more rapid progress in advancing the important fields of the intelligent model reduction methods. Topics of interest for this minisymposium include, but are not limited to the following:

- Machine (deep and manifold) learning
- Reduced-order and surrogate modeling
- Data-driven analyses
- Multi-scale, coupling and upscaling techniques
- Computational homogenization and RVE analysis
- Advanced and data-driven constitutive modeling
- Domain decomposition, parallel computing and GPUs
- Big data in design and manufacturing engineering
- Meta-modeling, incorporation of experimental data, etc.
- Verification, validation and uncertainty quantification
- Software development
- The link of CAE to CAD and CAM