

MS 05

Data-integrated modeling and simulation

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Beyond theory, experiment, and simulation, data integration is about to establish itself as the fourth pillar of science. Integrating data into simulation has the potential to replace traditional modeling approaches, for instance, in situations that require some sort of pattern recognition. But data-integration can also be used to enhance or accelerate classical modeling and simulation methods. Data availability is continuously increasing, establishing the further development of data-based methods as an emerging field. Data can emanate from experiments in this context, but it may also be simulation data. Reversely, purely data-driven approaches, like machine learning methods based on artificial neural networks, can be improved by merging them with classical elements of modeling, for instance, by implementing basic principles, such as energy conservation. This minisymposium invites contributions from all fields of computational mechanics that touch aspects of data integration into modeling and simulation. This includes, but is not restricted to, machine learning, artificial intelligence, visual analytics, model order reduction, reanalysis, coarse-graining, material modeling, computational homogenization, and parameter identification. Purely methodological contributions from the field of artificial intelligence or data processing with no particular link to modeling and simulation in computational mechanics are not in the focus of this minisymposium. Contributors are particularly encouraged to reflect on the pros and cons of data-driven methods in the context of computational mechanics and to share experiences about both successful and less successful applications.