EXCELLERAT

DATA ANALYTICS

The Data Analytics service focuses on a **comparative and advanced analysis of large scale simulation data**. Typical subjects are the organisation of the simulations according to the similarity of data fields, the extraction of physical modes or quantification of uncertainties in transient simulations. An additional emphasis lies on the development of in situ data analysis techniques.

SERVICES

- **UQit**, a software toolbox for uncertainty quantification in transient flows fields
  Contact: Saleh Rezaeiravesh, KTH: salehr@kth.se
- A software tool **SimExplore** and consulting about comparative analysis of simulation bundles including machine learning
  Contact: Christian Gscheidle, Fraunhofer: christian.gscheidle@scai.fraunhofer.de
- **Software toolbox** for modal decompositions of transient flow fields
  Contact: Simon Loosen, RWTH: s.loosen@aia.rwth-aachen.de
- Software tools and consulting on **in-situ data analysis** and simulation monitoring
  Contact: Christian Gscheidle, Fraunhofer: christian.gscheidle@scai.fraunhofer.de
- **Training activities about machine learning for simulations**
  Contact: Bastian Bohn, Fraunhofer: bastian.bohn@scai.fraunhofer.de

CHALLENGE

A comparison of simulations on fine meshes with many time steps poses several challenges. **Saving all the simulations generates a severe data handling problem**. A data analysis after termination of simulations can be performed by extracting some curves or scalar quantities; however, this implies a drastic reduction in the information content.

SOLUTION

- **Scalable data analytics client-server infrastructures** for an efficient way of performing data analysis for engineering simulations
- **Suitable analysis tools** with an interface to the visualisation environment, such that they can also be applied interactively

UNIQUE VALUE

The technology has been implemented for applications, uses cases from automotive, aerospace, energy and manufacturing industrial sectors that can **demonstrate the benefits of the advanced and in situ data analytics** to industrial partners.

BENEFIT FOR ISVS, INDUSTRIAL END USERS, CODE DEVELOPERS

- Efficient handling and analysis of large-scale engineering data from simulations
- Software tools for uncertainty quantification, modal decompositions and comparative analyses
- Consulting activities and training on machine learning for simulations

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