Contribution ID: **7** Type: **Talk**

UM-Bridge: Enabling complex scientific applications

Wednesday 16 October 2024 16:00 (1 hour)

Treating uncertainties in models is essential in many fields of science and engineering. When dealing with complex and computationally costly numerical models this necessitates a combination of efficient model solvers, advanced UQ methods and HPC-scale resources. The resulting technical complexities and software engineering challenges are holding back adoption of UQ methods in many fields. I will discuss the ways in which high-level abstractions can be used to break down technical complexity and enable a separation of concerns between experts. I will introduce UM-Bridge (the UQ and Modeling Bridge), a software protocol that facilitates universal interoperability of UQ software with simulation codes. Language-specific integrations make UM-Bridge models appear as native entities (classes, function calls etc.) in the respective programming language or even as native model classes in specific UQ packages.

Finally I will present a library of UQ benchmark problems, which we make available as an open-source software repository. UM-Bridge support makes the benchmarks available to virtually any UQ software and ensures portability and reproducibility via containerization.

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Session Classification: Invited