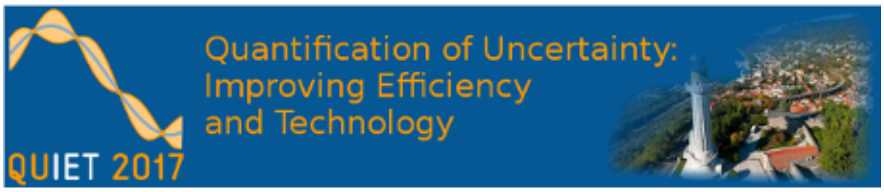


# Reduced-order models with space-adapted snapshots

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Space-adaptive numerical methods have recently found their way into reduced-order modeling of parametrized PDEs [1, 2, 3]. Standard techniques assume that all snapshots are computed with one and the same spatial mesh, which is often not appropriate for multi-scale problems. Instead, we consider unsteady adaptive finite elements, where the spatial discretization varies over time or stochastic sampling. Our focus is on reduced-order models obtained by a Galerkin projection onto a proper orthogonal decomposition (POD) of solution samples. In this context, adaptive snapshot computations allow a reduction of computational complexity in the offline-phase of the reduced-order model.

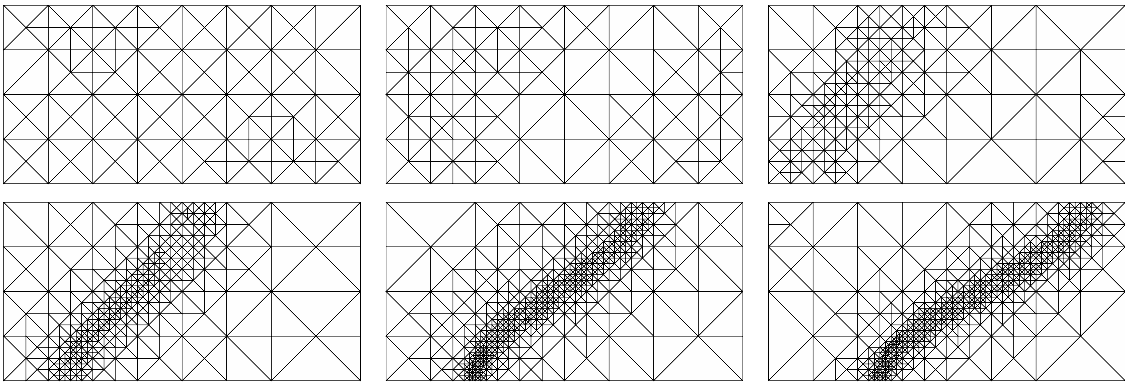

Figure 1: Adaptive finite element spatial discretizations.

The following points will be discussed in the talk:

- How can the effort for creating reduced-order models with space-adapted snapshots be minimized?
- How can the union of all snapshot meshes be avoided?
- What is the main difference between static and adaptive snapshots in the error analysis of Galerkin reduced-order models?

Numerical test cases illustrate the convergence properties with respect to the number of POD basis functions.

## References

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[3] M. Yano. A minimum-residual mixed reduced basis method: exact residual certification and simultaneous finite-element reduced-basis refinement. *ESAIM: M2AN*, 50:163–185, 2016.