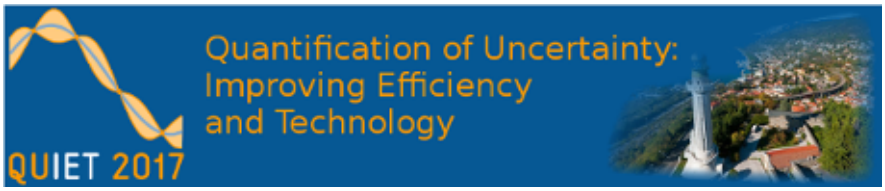

Weighted reduced order methods for parametrized PDEs with random inputs

F. Ballarin[1], D. Torlo[2], L. Venturi[3], and G. Rozza[1]

[1]International School for Advanced Studies, Trieste, Italy
[2]Universität Zürich, Switzerland
[3]Courant Institute of Mathematical Sciences, New York, United States

In this talk we discuss a weighted approach for the reduction of parametrized PDEs with random input. Reduction methods based on weighted reduced basis (wRB) [1, 2] and a weighted proper orthogonal decomposition (wPOD) approach [3] will be presented.

Concerning wPOD, a first topic of discussion is related to the choice of samples and respective weights according to a quadrature formula. As a proof of concept (applicable only to lower dimensional parameter spaces), we use both Monte-Carlo and tensor product quadrature rules, and discuss the reliability of the resulting wPOD-reduced problem depending on the chosen quadrature formula. Moreover, to reduce the computational effort in the offline stage of wPOD for higher dimensional parameter space, we test Smolyak quadrature rules. The accuracy of the resulting method will be discussed [3].

Concerning wRB, we present a stabilized weighted reduced basis method for random input parameters on advection diffusion problems with dominant convection. Comparisons between offline–online stabilization and offline-only stabilization will be shown [2].

References

[1] P. Chen, A. Quarteroni, and G. Rozza. A weighted reduced basis method for elliptic partial differential equations with random input data. *SIAM Journal on Numerical Analysis*, 51(6):3163–3185, 2013.

[2] D. Torlo, F. Ballarin, and G. Rozza. Stabilized reduced basis methods for advection dominated partial differential equations with random inputs. *In preparation*, 2017.

[3] L. Venturi, F. Ballarin, and G. Rozza. Weighted POD–Galerkin methods for parametrized partial differential equations in uncertainty quantification problems. *In preparation*, 2017.