Accuracy assessment of generalized parametric solutions for optimization and uncer-tainty quantification

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ABSTRACT

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This lecture demonstrates the capabilities of the Multi-Level Monte Carlo Methods (MLMC) for the stochastic analysis of CFD aeronautical problems with uncertainties. These capabilities are compared with the classical Monte Carlo Methods in terms of accuracy and computational cost through a set of benchmark test cases. The real possibilities of solving CFD aeronautical analysis with uncertainties by using MLMC methods with a reasonable computational cost are demonstrated.

On the other side, the superior performance of MLMC methods compared with classical MC ones will allow to solve robust optimum design problems with a much lower computational cost. Using the Kakuchi approach, these problems will be solved as traditional multiobjective ones in which not only the mean of each stochastic analysis but also the variance will be minimised.

Short Bio Express: Prof. Gabriel Bugeda Born in 1961, Dr. Gabriel Bugeda is professor at the Universitat Politècnica de Catalunya (UPC) since 2003. He has been the Planning Assessment and Quality vice-rector since 2008 till 2014. He is also responsible of many research projects at the International Center for Numerical Methods in Engineering (CIMNE). He has participated in more than 15 EC funded projects, working as coordinator in 5 of them. He has published more than 30 papers in international research journals and more than 50 communications to congresses. His main research lines are shape optimization, error estimation, mesh adapti