Abstract ID 1304

HPC IMPLEMENTATION OF THE MULTIPOINT APPROXIMATION METHOD FOR LARGE SCALE DESIGN OPTIMIZATION PROBLEMS UNDER UNCERTAINTY

Vassili Toropov[1], Yury Korolev[2], Konstantin Barkalov[3], Victor Gergel[3]

[1]Queen Mary University of London, United Kingdom
v.v.toropov@qmul.ac.uk

[2]University of Cambridge, United Kingdom
korolev.msu@gmail.com

[3]Lobachevsky University of Nizhny Novgorod, Russian Federation
barkalov@vmk.unn.ru, gergel@unn.ru

Keywords: Multipoint approximation,metamodel,trust region,risk measure,superquantile,HPC

Abstract: This paper presents a new development in the Multipoint Approximation Method that makes it capable of handling large (1000 design variables) optimization problems with uncertainty in design variables as well as in additional 'environmental' variables. The approach relies on approximations built in the combined space of design variables and environmental variables, and subsequent application of a risk measure and optimization with respect to the deterministic design variables, all within the iterative trust-region-based framework of MAM implemented in a high performance computing (HPC) environment. Several risk measures are considered and compared including mean plus N*sigma and superquantile. The performance of the proposed techniques is demonstrated by examples of large-scale problems.