

COLLOQUIUM OF THE DEPARTMENT OF APPLIED MATHEMATICS

How to best sample a solution Manifold?

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Abstract

Many design or optimization tasks in scientific computation require a frequent (even online) evaluation of solutions to parameter dependent families of partial differential equations describing the underlying model. This is often only feasible when the model is suitably reduced. The so called Reduced Basis Method is a model reduction paradigm that has recently been attracting considerable attention since it aims at certifying the quality of the reduced model through a-posteriori error bounds. The central idea is to approximate the solution manifold, comprised of all solutions obtained when the parameter ranges over the the given parameter domain, by the linear hull of possibly few snapshots from that manifold so as to still guarantee that the maximal error stays below a given target tolerance. This talk highlights the basic ideas behind this method revolving around greedy strategies for the construction of reduced bases. Moreover, some recent developments are indicated which address the optimal performance of new stabilized variants for problem classes that cannot not be treated well by conventional techniques, such as unsymmetric singularly perturbed problems. A crucial conceptual ingredient is shown to be a way of "pre-conditioning" the involved parameter dependent operators on the infinite dimensional level.

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