# Linear and nonlinear methods for model reduction

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**Abstract**

We consider model reduction methods for the approximation of multivariate analytic functions in the case where the functions depend on infinitely many variables but present a certain anisotropy. The usual approach to model reduction is to construct a low dimensional linear space $V_n$ and define the approximation as some projection into $V_n$. In such cases, the construction of one suitable linear space $V_n$ is not feasible numerically, for instance if the target accuracy is too small. It is well-known that nonlinear methods, such as adaptive or best n-term approximations, provide improved efficiency. The idea of then to replace $V_n$ by a collection of linear spaces (aka a library) $V_1, \dots, V_N$ of dimension $m < n$.

In this talk, we first introduce various anisotropic model classes based on Taylor expansions and study their approximation by finite dimensional polynomial spaces $P_{\Lambda_n}$ described by lower sets $\Lambda_n$ of cardinality $n$. Then, in the framework of parametric PDEs, we present a possible strategy that can be used to built a library and provide an analysis of its performance.

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