## Uncertainty quantification of coupled ODEs with stochastic collocation methods using adaptive higher order Runge–Kutta methods

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## ABSTRACT

Many real world problems need simplifications in such a way that computing time is reduced for answering specific questions, for example to quantify uncertainties. Therefore so-called metamodels or surrogate models are used, which are based on interpolation or approximation methods.

In this talk we consider a system of coupled ODEs and discretise the subsystems in time with adaptive high order Runge–Kutta methods [2]. This approach is called "partitioned method" and we use a Block Gauss-Seidel method for solving the final linear or non-linear systems. The motivation for using high order methods is the computation of very accurate numerical results. Moreover, these time integration methods are more effective than lower order methods [1] and in the case of the partitioned approach they need less iterations than lower order methods. Also, for the uncertainty quantification with stochastic collocation we can expect a higher accuracy and a faster convergence. Numerical results show the advantages of the noval approach.

## REFERENCES

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