# Theory of the space-time discontinuous Galerkin method and applications to fluid-structure interaction problems

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The paper will be concerned with the numerical solution of nonstationary problems with nonlinear convection as well as diffusion by the space-time discontinuous Galerkin finite element method (DGFEM) and with applications to the simulation of compressible flow.

In the first part the theory of the space-time DGFEM is treated. The time interval is split into subintervals and on each time level a different space mesh with hanging nodes may be used in general. In the discontinuous Galerkin formulation we use the nonsymmetric, symmetric or incomplete version of the discretization of the diffusion terms and interior and boundary penalty (i.e., NIPG, SIPG or IIPG versions). For the space and time discretization, piecewise polynomial approximations of different degrees $p$ and $q$, respectively, are used. We assume that the diffusion coefficient depends on the sought solution. In the theoretical analysis, the stability and error estmates of the method will be treated.

In the second part, the space-time DGFEM will be applied to the solution of the compressible Navier-Stokes equations in time-dependent domains and to problems of fluid-structure interaction. The efficiency and robustness of the method will be demonstrated by numerical experiments.

## References

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