# SPACE-TIME DISCONTINUOUS GALERKIN METHODS AND DISCONTINUOUS PETROV-GALERKIN METHODS FOR HYPERBOLIC LINEAR FRIEDRICHS SYSTEMS

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## ABSTRACT

We study weak solutions and its approximation of hyperbolic linear symmetric first-order Friedrichs systems describing acoustic, elastic, or electro-magnetic waves. A DGP method for acoustics is considered in [2, 3]; convergence for the ideal DPG method is analyzed in the graph norm. For a discontinuous Galerkin discretization with full upwind in space and time, inf-sup stability and convergence estimates are provided with respect to a mesh-dependent DG norm in [1]; this relaxes the regularity assumptions required in the graph norm and improves the estimates the by a factor $h^{1/2}$ in the space-time cylinder.

In this talk we show that the results for the space-time DG method in the mesh-dependent DG norm transfer to Petrov–Galerkin methods by constructing suitable discrete Fortin operators which extend the inf-sup stability of the mesh-dependent DG method to inf-sup stability of the Petrov–Galerkin method. This provides convergence estimates for different variations of discontinuous Petrov-Galerkin methods, where the trace spaces are discontinuous on the space-time skeleton.

## References

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