

Variational Time Discretisations of Higher Order and Higher Regularity

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Starting from the well-known discontinuous Galerkin (dG) and continuous Galerkin-Petrov (cGP) methods we will present a two-parametric family of time discretisation schemes which combine variational and collocation conditions. The first parameter corresponds to the ansatz order while the second parameter is related to the global smoothness of the numerical solution. Hence, higher order schemes with higher order regularity can be obtained by adjusting the family parameters in the right way.

All members of the considered family inherit stability from either dG or cGP. Furthermore, the presented time discretisations can be obtained alternatively by successive post-processing steps starting with dG or cGP, respectively. Furthermore, the considered schemes provide themselves a cheap post-processing which could be used for adaptive time-step control.

Optimal error estimates and some numerical results will be given.

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