

Stabilisation methods of local projection type for convection-diffusion-reaction problems

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Stabilisation methods by local projection are commonly used for solving convection dominated problems, especially for chemically reactive flows. We present a unified analysis of projection methods for scalar problems. In contrast to the known two-level local projection methods our approach allows to construct new finite element schemes employing only one mesh. The main advantage of local projection methods is their symmetric nature. Compared to standard residual methods additional couplings in stabilising terms can be avoided for diffusion-convection-reaction systems. In reaction problems with non-linear kinetics the interactions between species can cause troubles. In general our method leads to the reduction of computing effort in order to resolve iteratively nonlinear reaction terms. We study numerically mixed boundary layer problems as well as systems occurring in reactor chemistry.

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