

Local projection stabilization for problems with non Dirichlet conditions

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The local projection stabilization (LPS) method is already an established method for stabilizing saddle-point problems and convection-diffusion problems. However, the a priori error analysis is usually done for homogeneous Dirichlet data. However, it turns out that without Dirichlet conditions the situation is much more involved. Even in the case of Stokes stabilization without Dirichlet conditions on the entire boundary, the standard approach has to be modified. This is due to some partial integrations needed in the analysis. In the non Dirichlet case, additional boundary integrals appear which can not be absorbed by available quantities. Therefore, the LPS method must be adapted in this case.

In this work, we explain the differences of the Dirichlet and non-Dirichlet case. A possible modification and an a priori error estimate will be presented. Applications arise e.g. in coupled Darcy-Stokes problems where interior layers (interfaces) may arise and require such algorithmic adaptations of standard methods.