

## Local projection stabilisation on layer-adapted meshes for convection-diffusion problems with characteristic layers (Part II)

Sebastian Franz<sup>1</sup>, Gunar Matthies<sup>2</sup>

### ABSTRACT

In Part II we analyse different higher order finite element spaces. Each of them can be characterised as enrichment of the  $\mathcal{P}_{p+1}$  or reduction of the space  $\mathcal{Q}_{p+1}$  for  $p \geq 1$ .

We prove anisotropic error estimates for those spaces for an vertex-edge-element interpolation operator. For computational purposes it is sometimes favorable to have pointwise defined interpolation operators. We will show, that some of these fulfil the anisotropic estimates too and therefore hold convergence for the Galerkin FEM and the Local Projection Stabilisation FEM.

Numerical results confirm the theoretical findings and we compare the convergence behaviour of the different elements considered.

<sup>1</sup>Department of Mathematics and Statistics  
University of Limerick  
Limerick, Ireland  
`sebastian.franz@ul.ie`

<sup>2</sup>Fachbereich Mathematik  
Universität Kassel  
Heinrich-Plett-Strasse 40, D-34132 Kassel, Germany  
`matthies@mathematik.uni-kassel.de`