

Superconvergence for higher-order Galerkin FEM for convection-diffusion problems

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For singularly perturbed convection-diffusion problems and many numerical methods a *supercloseness property* is known for bilinear elements. This means that the difference between the Galerkin FEM solution u^N and the bilinear interpolant of the exact solution u is convergent of order two in the energy norm, although $u^N - u$ is only convergent of order one.

We will investigate similar properties for higher-order Galerkin FEM and look especially at the choice of suitable interpolation operators. Having a supercloseness property, it is cheap to obtain a better numerical solution by simple *postprocessing* — a superconvergent solution that enjoys a higher order convergence rate. We will address different possibilities for this kind of postprocessing.

References:

[1] S. Franz, H.-G. Roos: Superconvergence for Higher-Order Elements in Convection-Diffusion Problems, Preprint *MATH-NM-03-2013*, 2013

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