A priori and a posteriori analysis of a local scheme for elliptic equations

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Abstract: We consider a new local finite element scheme for convection-diffusion-reaction problems and present a priori and a posteriori error analysis of the method. The algorithm is based on a coarse solution in the whole domain, it proceeds by refining the mesh where the error is estimated to be large and improves the solution by solving local elliptic problems with artificial boundary conditions. The a priori analysis is performed in the Gradient Discretization framework under minimal regularity assumptions [1]. Convergence for linear and semi linear problems is established. The a posteriori error estimators [2] allow to select the local domains and provide bounds that are robust in singularly perturbed regimes.

References

[1] A. Abdulle and G. Rosilho de Souza. *A local scheme for linear and semi linear elliptic equations: a priori analysis.*, (in preparation).

[2] A. Abdulle and G. Rosilho de Souza. *A local scheme scheme for linear elliptic equations: a posteriori analysis*, (in preparation).