CPDE II, SuSe 19
Humboldt-Universität zu Berlin
Institut für Mathematik
Lecture: Prof. Fleurianne Bertrand, Tutorials: Philipp Bringmann

Exercise Sheet 7

Discussion on 10 June 2019

Please be prepared to present one or more of the following exercises on the blackboard. If not stated otherwise, algorithms or code can be displayed in Matlab or pseudocode.

Exercise 1 (Raviart-Thomas on quadrilateral grids). Consider the quadrilateral meshes from [Arnold-Boffi-Falk, 2005, Fig. 1] and show that they do not allow for an optimal approximation in the $H(\mathrm{div}, \Omega)$ seminorm.

Exercise 2 (Least-squares FEM for linear elasticity; implementation). Implement the least-squares FEM for linear elasticity from Exercise 6.1 with conforming discretision using the lowest-order Raviart-Thomas and Courant finite elements. Compare the results of the adaptive algorithm with those from Exercise 4.4.

Hint: Note the updated software package on the lecture's homepage.

Literature. The following references concern the prerequisites from functional and numerical analysis required for this exercise sheet. Every reference is electronically available in the HU library and from HU intranet (e.g., eduroam).

- D. Arnold, D. Boffi, R. Falk, Quadrilateral $H(\mathrm{div})$ finite elements, SINUM 42 (6), 2005.