Lab 05 - Error Computation

Deal.II Users and Developers Training

SMR2909 - MHPC P2.5

Martin Kronbichler kronbichler@lnm.mw.tum.de and **Luca Heltai** luca.heltai@sissa.it

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1. The topic of this lab session is a modified version of step-4 made available for you https://www.dealii.org/8.4.0/doxygen/deal.II/step_4.html

2. For more information about computing errors see step-7 (it is a bit more complicated though) https://www.dealii.org/8.4.0/doxygen/deal.II/step_7.html

3. Run the program and check the graphical and text output.

4. Where is the right-hand side defined and where do the boundary conditions come from?

5. Fix the right-hand side and boundary conditions to get the manufactured solution

$$u(x) = \sin(\pi x) \cdot \cos(\pi y)$$

   and make sure the L2 errors are converging.

6. Increase the polynomial degree of the finite element space and check the convergence of the L2 error.

7. Implement the computation of the H1 error. For this you need to compute the gradient of the manufactured solution and implement it (see commented out code for a start).

8. Implement a suitable 3d manufactured solution and test the convergence.