

Lab 02 Sparsity Patterns (step-2)

Computational Methods for PDEs Summer School 2019

1. See documentation at https://www.dealii.org/current/doxygen/deal.II/step_2.html
2. Run the included version of step-2. Look at the sparsity patterns in firefox.
3. How does the pattern change if you increase the polynomial degree from 1 to 2 or to 3?
4. How does the pattern change if you use a globally refined (say 3 times) unit square?
5. Are these patterns symmetric? Why/why not?
6. How many entries per row in the sparsity pattern do you expect for a Q1 element (assuming four cells are around each vertex)? Check that this is true for the mesh in b) (look for `row_length(i)` and output them for each row). Can you think of a 2d mesh (without hanging nodes) that has a row with more entries?
7. Bonus: Print all entries for row 42 for the original renumbered sparsity pattern.
8. Bonus: Compute and output statistics like the the number of unknowns, bandwidth of the sparsity pattern, average number of entries per row, and fill ratio.