2d-FEM on L-Shape Domain

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February 2021

1 Project Description

This is a part of my final project of the course Computational Methods for Engineering Applications I finished in my fifth semester.

The goal of the project was to solve the stationary reaction diffusion equation on an L-shape domain, which is why a FEM-approach instead of a finite difference approach was chosen.

The differential equation reads:

$$\begin{gathered} -\nabla \cdot (\sigma \nabla u) + ru = f(x) \quad in \quad \Omega \subset R^2 \\ u(x) = g(x) \quad on \quad \partial\Omega \end{gathered}$$

The code allows for different functions σ, f and boundary conditions g to be implemented in L-shape.hpp and fem2d.cpp, but as an example the functions

$$\sigma(x,y) = 0.01(x+2)^2, \quad f(x,y) = \sin(\pi y)^2, \quad r = 0.5, \quad g(x,y) = x^3 + y$$

are chosen. The final solution can be plotted by using the script Plot L-shape.ipynd script located in the cmake-build-debug directory.