

Project II – Applications in three dimensions

The deadline for this assignment is 25. November 2018 and counts towards 20% of the final grade. The delivery consists of a short report describing the method and presenting the results, together with a source code in MATLAB or Python. Working in pairs is possible but not compulsory.

A short presentation of the results will be organized on 20. November 2018 to share your results and as a farewell party.

1 Projects

The proposed topics are build on the work done for the Helmholtz equation for Project I.

Any of the traditional tracks can be chosen, and one additional:

- Making a princess cake: solving the Heat Equation, Section 5.1 [2].
- Structural analysis, Section 5.2 [2].
- Vibration analysis, Section 5.3 [2].
- Poisson with varying coefficient, Section 4 [1] plus extension.

The last option alternative track is to implement the Poisson Equation in three dimensions with varying coefficient, by first extending the implementation in the constant coefficient case Section 4. [1] to three dimensions, then choosing a Finite Element discretization for an analytic solution with varying coefficient. Depending on your interest or Master Thesis work we can discuss which Finite Element discretization to use.

For integration rules in three dimensions, refer to [1].

Bibliography

- [1] Kjetil André Johannessen. Tma4220: Programming project - part 1. https://wiki.math.ntnu.no/_media/tma4220/2018h/ps1.pdf, 2016. NTNU.
- [2] Kjetil André Johannessen. Tma4220: Programming project - part 2: Bake, shake or break - and other applications for the fem. https://wiki.math.ntnu.no/_media/tma4220/2018h/ps2.pdf, 2016. NTNU.