

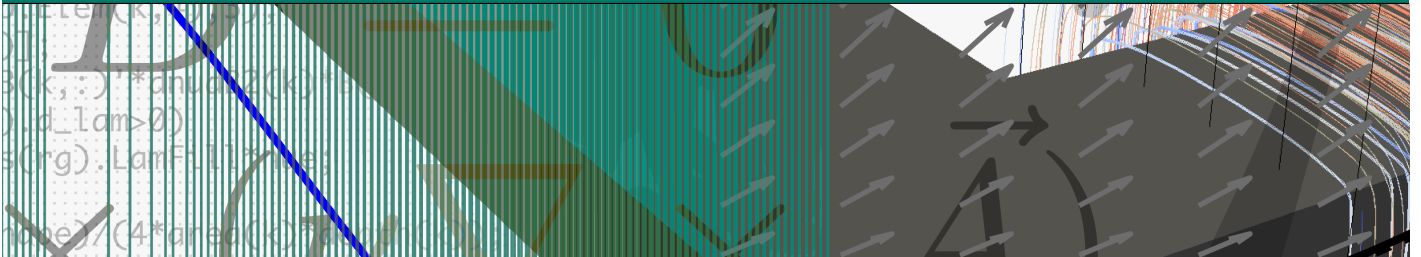
Development of a 2D simulation toolbox within the BEMBEL framework



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Master Thesis

Study field: Computational Engineering | Electrical engineering | Mathematics



Description

Within the last four years, a boundary element simulation framework for the solution of electrostatic, acoustic, and electrodynamic problems for 3D applications called *BEMBEL* has been developed together with the universities of Twente (Netherlands) and Lugano (Switzerland). The project had a significant impact in science and industry, due to its efficient use of the concept of isogeometric analysis within a Galerkin framework.

However, many applications require the solution of 2D problems, which *BEMBEL* does not currently support. This thesis aims to close this gap through the implementation of a fully integrated 2D simulation framework for the numerical solution of the Laplace and Helmholtz equation, build upon existing routines and expert knowledge of the cooperation partners in Twente and Lugano.

Work plan

To lay a solid foundation for the project, a literature study on a suitable solution method (e.g. Nyström, Galerkin) and isogeometric analysis is required. Afterwards, the main work consists of the implementation of a 2D simulation framework, partially based on existing code. During development, a visit to one of the partner institutes in Twente or Lugano is possible. The final step is the validation of the code through numerical experiments, and the summary and documentation of the work in the form of the thesis.

Prerequisites

Basic knowledge in numerical methods, programming experience in C/C++, experience with git.

References

- BEMBEL: The boundary element method based engineering library, see www.bembel.eu for further information.

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Figure 1: A Bembel.