

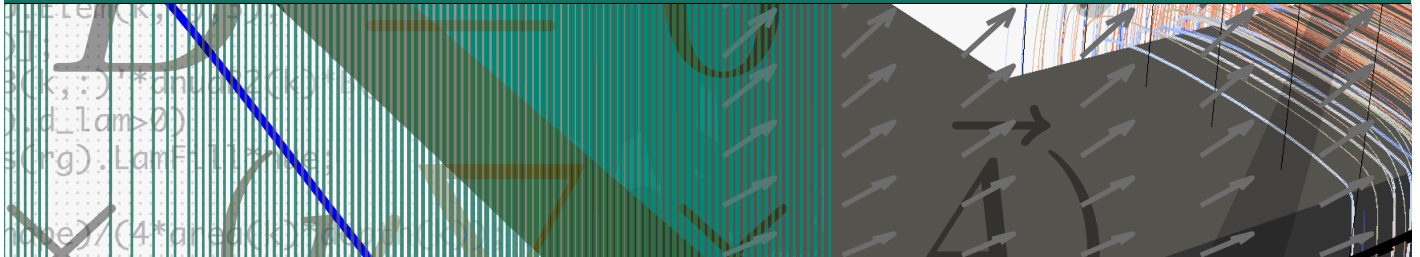
More Flexible Number Formats for High-Accuracy Simulations



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Proposal for a Master's thesis

Study field: Computational Engineering | Computer Science | Electrical Engineering | Mathematics



Description

TU Darmstadt, together with the universities of Basel, Bonn and Lugano, develops the free isogeometric boundary element library Bembel, see www.bembel.eu. The library is well-suited for electromagnetic applications in which highly accurate solutions are required. For such problems, the commonly-used IEEE 754 floating-point standard may arise as a bottleneck to the accuracy of the numerical solution, as rounding errors can become dominant. Thus a more flexible number representation is expected to become advantageous. The purpose of this master thesis is to replace the numerical backend of Bembel, currently implemented in the eigen linear algebra library, with MTL, a numerical backend in which the floating-point standard can be exchanged easily.

The thesis can be supervised by TU Darmstadt, a partner university (e.g. Lugano) or by one of the industrial partners, i.e., SimuNova or Stillwater Supercomputing.

Work plan

- Study of Bembel and its software architecture, with the help of the libraries authors
- Brief study of boundary element methods and the benchmark problems
- Brief study and comparison of different floating-point standards
- Benchmarking of different problems using different number formats

Prerequisites

A strong affinity to programming and experience with C/C++ (or the motivation to learn it on short term). Basic understanding of numerical schemes for the solution of partial differential equations.

Contact:

Dr. Felix Wolf
Prof. Dr. Sebastian Schöps
sebastian.schoeps@tu-darmstadt.de

Contact:

Dr. Peter Gottschling
SimuNova UG

Contact:

Dr. E. Theodore L. Omtzigt
Stillwater Supercomputing Inc



Figure 1: Bembel Logo