

Bachelor Thesis / TI Project

The Perfectly Matched Layer for 2D Curved Boundaries

Motivation

A Perfectly Matched Layer (PML) is an important tool for simulating free-field radiation problems using the Finite Element Method (FEM). Basically, it is an artificial layer with specific damping properties that is attached to the simulation domain to pretend open-domain radiation.

Our in-house open-source simulation code **openCFS** lately supports PMLs on curved boundaries, exploiting a transformation into curvilinear coordinates to apply the correct damping functions. So far, the implementation only considers 3D geometry.

Tasks

Participate in a large open-source software project.

- Enrich the existing 3D implementation with a 2D case
- Implement an algorithm to compute normal/tangential vectors and curvatures on the interface
- Design test cases to verify the implementation

Learning goals:

- Get in touch with Git, C++, Coreform Cubit, Paraview, and openCFS
- Get in touch with FEM, PMLs, and discrete geometry.

ResearchQuestions

What are the validity limits of the formulation concerning the provided geometry?

Organisation

- Language: English preferred, German possible
- **Start:** immediately possible
- Duration: 2 Semesters maximum

Contact

Patrick Heidegger, Manfred Kaltenbacher Inffeldgasse 16 C patrick.heidegger@tugraz.at ID01122

