Coercive Space-Time Boundary Element Methods for the Acoustic Wave Equation

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We are particularly interested in numerical methods that can solve transient wave equations in an accurate and computationally efficient manner. For this reason, we pursue a space-time boundary element method based on the new boundary integral formulation proposed in [1].

The goal of this master project is to implement this new space-time discretization and to investigate its practicability.

Research description

Within this master project the following tasks are foreseen:

1. Research literature on space-time methods for the wave equation.
2. Research literature on time dependent BEM for the wave equation.
3. Analyse and implement the new approach.
4. Run numerical experiments and compare the new approach with existing ones.
5. Master thesis.

No previous knowledge on BIE or BEM is needed, but the student is expected to be willing to learn some key notions, and to have basis knowledge of numerical methods, discretization schemes, finite elements, and programming.

References

[1] O. Steinbach, C. Urzúa-Torres: *A New Approach to Time Domain Boundary Integral Equations for the Wave Equation*. OWR-2020-5, pp. 99–101, Mathematisches Forschungsinstitut Oberwolfach.