Three quasi-Trefftz bases for the 3D convected Helmholtz equation

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Trefftz methods can be expressed as Discontinuous Galerkin methods with PDE-dependent basis functions. More precisely the basis functions are (locally) exact solutions to the governing PDE, which is referred to as the Trefftz property. For example, in the context of time-harmonic wave propagation, plane waves can often be leveraged to construct functions satisfying the Trefftz property.

For propagation in inhomogeneous media – modeled by variable-coefficient PDEs – in general no exact solution is known, so Trefftz methods cannot be implemented. However, in this case, the Trefftz property can be relaxed: basis functions can be defined as approximate (rather than exact) solutions to the governing PDE. This is the idea of quasi-Trefftz methods.

In this presentation we will discuss different families of quasi-Trefftz functions for acoustic wave propagation in a given fluid flow, including aspects related to their definition and their construction as well as their approximation properties.

REFERENCES

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