# A One-Way Coupling Setup for the Efficient Simulation of Aeroacoustics Problems with Far-Field Propagation

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## ABSTRACT

The simulation of computational aeroacoustics (CAA) problems poses the problem that requirements for the solver differ between near-field and far-field computation. For example, by taking an acoustic/viscous splitting approach to CAA, we can benefit from the scale separation of the acoustic and the flow field[1]. However, in this case the near-field requires a geometry representation, while the wave propagation distances are relatively small. Other physical effects, such as combustion or multiphase flow, might also have to be considered. In contrast, the far-field often is of lesser geometric complexity, it will contain acoustic content exclusively, and the waves have to travel a much greater distance.

If we are interested in the specifics of the far-field propagation, and we don't want to rely on using aeroacoustic analogies, it might be a good idea to partition the computational domain and apply specialized solvers.

In the wider context of turbulent fluid-structure-acoustics simulations, we present a setup for CAA simulations in which we use a second-order Finite-Volume code for the near-field, and a high-order Discontinuous Galerkin solver for far-field propagation. Employing the coupling library *preCICE*[2], we establish a one-way coupling between them to exploit the wave propagation direction. We also consider the accuracy[3] of the coupled solution, and the load balance between the solvers to obtain high scalability.

## REFERENCES

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