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Large Scale Transient and Stationary Shape Optimization

The aim of this talk is to discuss numerical schemes for shape optimization of both time-dependent and fixed geometries. Time-dependent geometries not only arise in some tomography problems, but also within wind-turbines and morphing wings. Efficient numerical schemes can be based on tube derivatives coupled to an ALE formulation, which can be interpreted as a special kind of shape derivative in a transversal direction.

For fixed geometries, shape calculus and operator symbol approximations are used to construct higher order optimization schemes, curing the so called “loss of regularity” otherwise often encountered during shape optimization based on the Hadamard form.

Application examples range from CFD and aerodynamic design to wave propagation and tomography problems involving the linear wave equation or Maxwell’s equation.