

Fast Methods for Certain and Uncertain Shape Optimization

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Abstract: Any technical system has a geometrical design which can be optimized to achieve certain goals. From a mathematical point of view, systems are of high interest, which are modeled by a set of partial differential equations. This talk discusses fast numerical methods for the shape optimization in aerodynamics and acoustics. The key factors for success are the numerical exploitation of the shape calculus, the usage of a one-shot optimization framework and good approximations of shape Hessians generated from analytical insight.

Furthermore, the modeling of technical systems is always subject to inherent uncertainties. We will highlight the challenges caused by uncertainties present in aerodynamics and shape optimization and also give ideas for the numerical treatment of these challenges. Numerical results achieved within collaborative efforts together with aircraft industry and the German Aerospace center will be presented.

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