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Recent trends in shape and topology optimization

Towards Lagrange-Newton Methods in the Context of Shape Calculus

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Abstract: Efficient numerical methods for shape optimization problems aim at gradient based optimization methods. Highest efficiency is reached, if second order methods can be employed or approximations thereof. This poses a certain challenge for shape optimization methods, which employ shape calculus for efficiency reasons. The challenge lies in the fact that the space of shapes is not a linear space. This talk proposes the usage of shape manifolds in order to carry over NLP methodology to shape optimization problems. Numerical results for PDE constrained shape optimization problems are provided, as well as a scalability study in a high performance computing framework.