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The landscape of optimization methods for fluid flow problems is continuously broadening. Beside traditional approaches like parametric optimization, new methods like nonparametric (topology) optimization schemes are increasingly discussed. Optimality Criteria (OC) based topology optimization combines the benefits of an easy, straight-forward setup with a reasonable calculation effort for large solution spaces. Using this method often results in new, sometimes unconventional design ideas (innovation!).

This presentation starts with a brief introduction into the OC-based topology optimization methodology. With this approach, STAR-CCM+ emerges from being an analysis tool to becoming also a design tool. Topology optimization ?generates? design proposals for channels (e.g. with low pressure drop) automatically within a given design space.

The potential of this method is demonstrated with an application to optimize fluid flow in a DOC system. The optimization objective is to find a low pressure drop design as well as high flow uniformity within the monoliths. The resulting optimized design proposals show a significant pressure drop reduction and a better flow uniformity.

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