

PARAMETRIC ADJOINT OPTIMIZATION:

Using adjoint sensitivities to quantify the effect of design variables in a parametric CFD model.

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In recent years, adjoint optimization has been a topic of increasing interest in both industrial and research sectors. While the efficiency of adjoint methods make it well suited for large industrial applications, classical stochastic optimization has advantages of its own. One of the more attractive aspects of the stochastic approach is the ability to perform multi-objective optimization and the ability to function within on the bounds of prescribed construction constraints. Drawbacks of this flexibility include a significant computational price as well as the need for the knowledge/experience to discriminate dominant effect parameters in order to make the study feasible. Employing stochastic optimization on a large number of parameters is prohibitive in many applications even when using the latest and most efficient available algorithms. This is especially true for large scale CFD based industrial studies. ICON and Friendship-Systems have been working together to bridge the gaps in the two methods and combine those in a hybrid and more efficient methodology. This work explains the theoretical background and presents a number of industrial level cases analyzed using the developed methodologies.

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