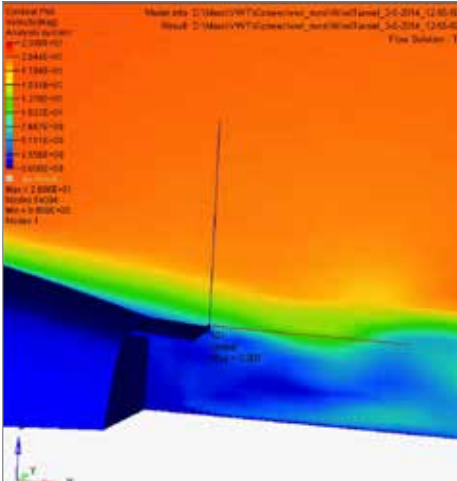


# Fluid - Structure Interaction Analysis and Optimization of an Automotive Component

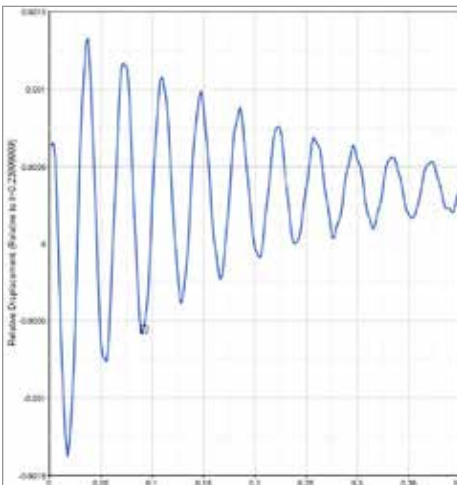
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## Overview

This paper discusses the behavior of a flexible flap at the rear end of a generic car model under aerodynamic loads. A strong bidirectional coupling between the flap's deflection and the flow field exists which requires this system to be simulated in a coupled fluid-structure manner.

A coupled transient aerodynamic and structural simulation is performed for a generic car model with a flexible/deformable flap at the rear end. An automatic workflow is established which generates new flap designs, derived from an initial flap design by applying a mesh deformation technology, and performs the coupled fluid-structure interaction analysis. For each shape variation, the flap's maximum displacement is monitored and used to classify the individual flap designs. This process allows for design of experiment (DOE) studies in an automated manner.



Fluid analysis and chart

Several shape variations of the flap and their impacts on the maximum deflection are investigated. Design changes causing a reduction in the maximum deflection are identified and used in an optimization loop to determine a flap design with minimum displacement.

► For more details, visit <http://papers.sae.org/2014-01-2446/>