

Kandidatarbete vid Institutionen för Mekanik och Maritima Vetenskaper

Titel

Can a Formula 1 type diffuser improve the aerodynamic performance of a Formula Student car?

Bakgrund

Formula Student (FS) is an educational competition format in which university students design, build, and run small formula style race cars, see the picture below. Formula Student has been present at Chalmers since 2002 under the name Chalmers Formula Student (CFS), and since 2015 CFS builds electric cars. Even though the average speed around a typical Formula Student track is low for a race car - in the order of 40 km/h - top speeds can reach 110km/h and well-designed aerodynamic surfaces – the surface shapes of wings and chassis - are of essence in order to set competitive lap times.



CFS19, named Viktoria and developed for the 2019 season.

Problembeskrivning och mål

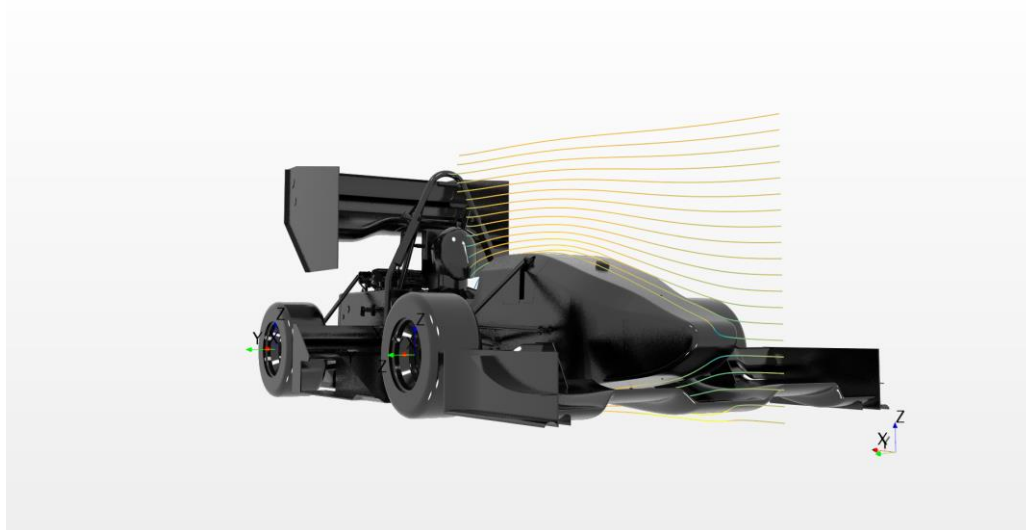
The purpose of this BSc thesis project is to investigate a new aerodynamic concept for CFS that generates more of the car's downforce from the underbody by using a larger diffuser. This concept is inspired by the underbody design typically found in a Formula 1 car. In order to obtain a robust comparison of different variations of this concept, a variety of driving scenarios representing typical on-track conditions, including transient events, should be accounted for.

The intended outcomes of the project are

- A design for the aerodynamic surfaces of the monocoque (frame structure) and the underbody that will be used for the CFS22 car (which will be built in the academic year of 21/22.)
- A methodology for robust evaluation of the aerodynamic surfaces of a Formula Student car using CFD. The methodology is expected to consist of a set of selected driving scenarios that should be simulated in order to obtain a representative evaluation of the aerodynamic performance of a given design. The methodology should be fully automated to guarantee robustness of the results.

Metod och genomförande

The design will be drawn in CAD (Catia) and will be evaluated using Computational Fluid Dynamics (CFD) and the software Star CCM+. The CAD and CFD models of current CFS cars will be made available as a starting point. The aerodynamic performance of the developed concept will be compared to that of the current CFS car.



Velocity streamlines over the car body.

Målgrupp

M, F & Kf-studenter

Grupstorlek

3-6 studenter

Litteraturförslag

W.H. Hucho; Aerodynamics of Road Vehicles
<http://www.sciencedirect.com/science/book/9780750612678>

Speciella förkunskapskrav

Nej, men en kurs in strömningsmekanik är önskvärt

Handledare

Erik Josefsson, Doktorand (M2)

Examinator

Simone Sebben, Professor (M2)

Kan projektet dubleras? JA / NEJ

Nej

Övrigt

Språk: Engelska

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