

Car Aerodynamics

A 12-credit-point Final Year Project for two students studying Mechanical or Aerospace Engineering

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Background

The wakes of bluff bodies such as cars are highly three-dimensional and complex, but understanding the structures in the wake is necessary to alter the forces acting on a body. Recent work (Venning et al. 2015) has shown that the wake of the Ahmed body (a generalised automobile shape) is influenced by the aspect ratio of the rear slant. It is currently unclear what effect this wake change has on the body forces (lift and drag) acting on the model. Furthermore, the configuration of the stilts used to attach the body to the ground plane is known to change the underbody flow, though this is yet to be studied in detail.

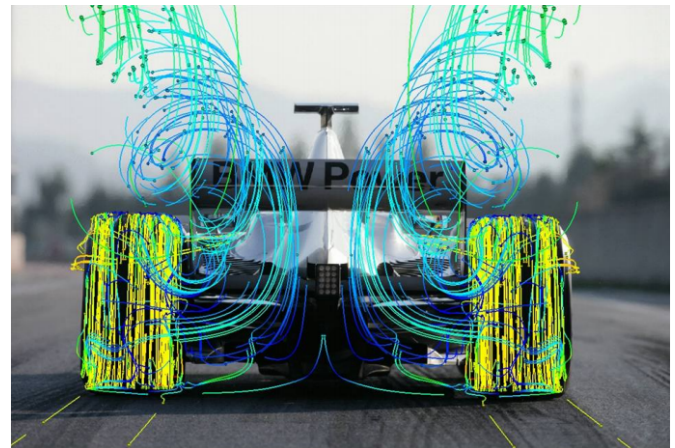


Figure 1: Trailing vortices behind a BMW Formula 1 car.

Project description

This experimental project has three aims:

1. Quantify the pressure on the rear surfaces as a function of aspect ratio
2. Correlate velocimetry measurements with force measurements
3. Investigate the effect of stilt configuration (number, shape, pattern) on the underbody flow

Experiments will be performed in the FLAIR water channel (www.flair.monash.edu.au) using state-of-the-art velocimetry and force measurement techniques.

Student requirements

This project will suit students that have a strong understanding of fluid mechanics and MATLAB. The project will be 12 credit points.

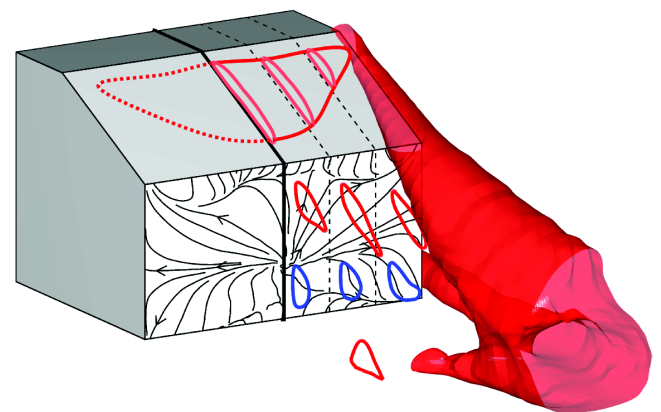


Figure 2: Major flow structures in the wake of the Ahmed model.