MONASH
ENGINEERING

MONASH University

Faculty of Engineering
Summer Research Program 2023-2024

Project Title: Laser Visualisation and Control of Ground Vehicle Wakes

Supervisor(s): Professor Kerry Hourigan

Department: Mechanical and Aerospace Engineering

Email: kerry.hourigan@monash.edu

Website profile of project supervisor: FLAIR – People (monash.edu.au)

Objective

Utility-type vehicles represent a significant portion of road vehicles, with half of the top ten selling vehicles in the United States being pick-up trucks. Substantial energy consumption of utility vehicles arises from overcoming aerodynamic drag. Active flow control is an emerging method with the potential to reduce drag on vehicles by a larger margin than previously researched passive devices. The variation in specific geometry of utility vehicles necessitates the use of a simplified and standardised geometry to better understand the general aerodynamic principles. For utility vehicles, one such standardised model is the Ahmed Utility Body. This research project firstly aims to analyse the time resolved flow around the Ahmed Utility Body using water channel Particle Imaging Velocimetry (PIV). With detailed understanding of the flow field data, thoughtful active flow control experiments can be planned, designed and tested. Through local boundary, pressure or velocity changes, bulk flow manipulation can occur. Findings from this study have potential to impact real world vehicle design, leading to a more sustainable future.

Project Details

The research project will be conducted in FLAIR water channel. Using existing wind tunnel data from the Ahmed Utility Body, informed PIV water channel measurements will be undertaken on a scale model. The results of this preliminary investigation will guide research into active flow control on the body. Using additive and traditional manufacturing techniques, an upgraded model will allow for the application of a moving flap to better understand the effects on drag. This project will require hands on experimental work, design engineering and complex data analysis.

Prerequisites

To be considered you must have completed at least 96 credit points of an undergraduate degree (usually 2 years) and have a weighted average mark of 80% or higher. You will demonstrate a strong understanding of fluid dynamics.