Workshop on Sports Aero- and Hydrodynamics
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Aerodynamic Performance in Formula 1

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Abstract

Formula 1 racing represents the pinnacle of sports engineering excellence. In 2021, Formula 1 teams will compete in 23 events across 5 continents all driven by the ultimate goal of being crowned world champions. In the quest for the most elusive performance differentiators, Aerodynamic science represents one of the fiercest battlegrounds. This talk will delve into the importance of Aerodynamic performance in Formula 1.

The basic philosophy of aerodynamic performance for racing cars is first explored in the context of simplified tyre dynamics (Katz [2006]). A brief review of the seminal work by Fackrell [1974] on simplified wheel (and tyre) aerodynamics is then given. It will be seen that while studies of a wheel (and tyre) in isolation provide some useful insight into the flow phenomena around the front wheel of a F1 car they critically lack the complex interaction with flow features coming from the front wing. The influential roles played by state-of the-art experimental and computational technologies in understanding the physics of these complicated flow physics phenomena will be discussed.

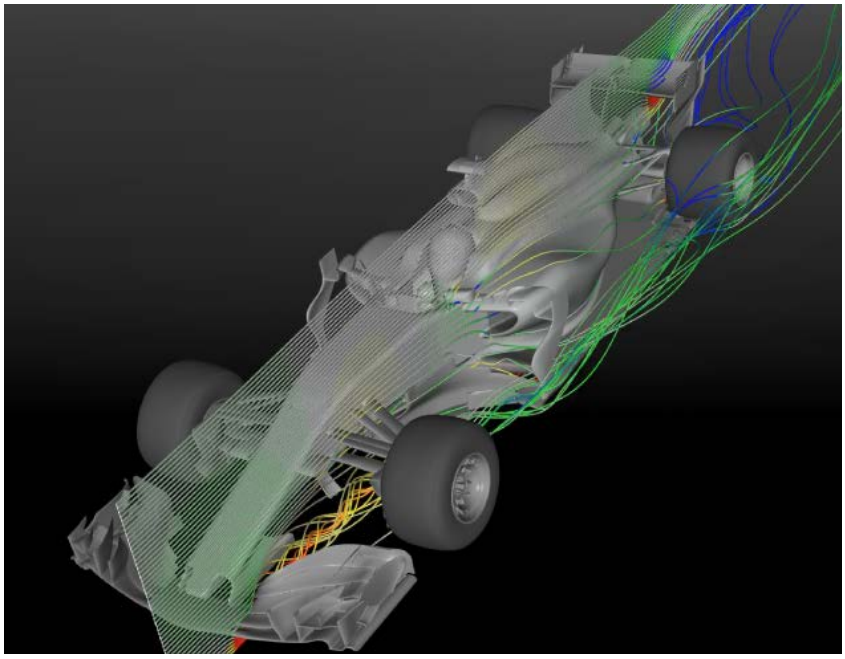

Fig. 1 Flowfield visualisation of the 2017 Renault F1 car.

References

Fackrell J. E. 1974. The Aerodynamics of an isolated wheel rotating in contact with the ground. Ph.D Thesis. University of London.

Katz J. 2006. New directions in race car aerodynamics. Robert Bentley Publishers. 2nd Edition.