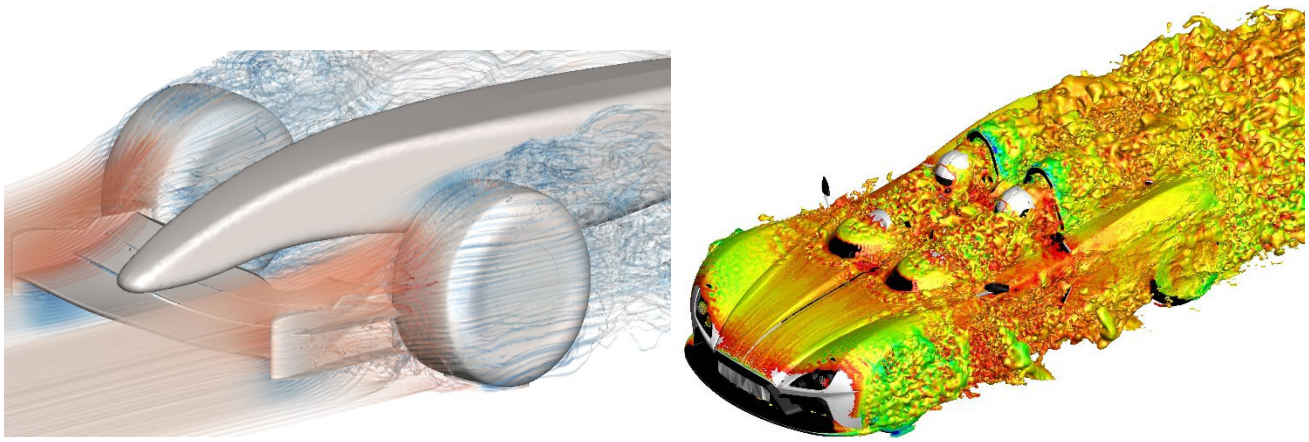
cfaed Seminar Series

DATE: 15 May 2018
TIME: 11.10 am
LOCATION: Room 252, Zeunerbau, TU Dresden, George-Bähr-Straße 3, 01069 Dresden

SPEAKER:
Prof. Spencer Sherwin, (Department of Aeronautics, Imperial College London, UK)

TITLE:
"Spectral/hp element, scale resolving modelling for high Reynolds number motorsport flow simulations"

Abstract:
The use of computational tools in industrial flow simulations is well established. As engineering design continues to evolve and become ever more complex there is an increasing demand for more accurate transient flow simulations. It can, using existing methods, be extremely costly in computational terms to achieve sufficient accuracy in these simulations. Accordingly, advanced engineering industries, such as the Formula One (F1) industry, are looking to academia to develop the next generation of techniques, which may provide a mechanism for more accurate simulations without excessive increases in cost.



Spectral/hp element simulation over flow past an F1 and track car geometries

This demand for modelling of accurate flow physics around complex geometries are therefore making high order methods such as spectral/hp type discretisations more attractive to industry. Nevertheless, a number of challenges still exist in translating academic tools into engineering practice. As the start of the pipeline, meshing techniques for high order methods are required to handle highly complex geometries.

Next many engineering problems require high Reynolds numbers leading to turbulent flow that typically are only marginally resolved. Therefore, there is a need for greater robustness in marginally resolved conditions where aliasing errors and high frequency damping are typically required. Finally maintaining computational efficiency is also obviously important.
In this presentation, we will outline the demands imposed on computational aerodynamics within the highly competitive F1 sector and discuss the numerical challenges, which have had to be overcome to translate academic tools into this environment.