EMERGING HIGH FIDELITY CFD SIMULATION FOR ADVANCED AERODYNAMICS DESIGN

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ABSTRACT

In this presentation we will outline the capability of emerging high fidelity CFD suitable for modelling flows around complex geometries that typically arise in road or race car aerodynamics design. While RANS and Detached Eddy Simulation are the workhorse simulation tools for most industrial aerodynamics design, to achieve the next level of fidelity one must remove the limiting modelling assumptions that are typically used to represent turbulent boundary layers. This naturally lead us to wall capturing/resolving large eddy simulations. These simulations require a notable increase in computational cost which can be moderated by using high order methods such as spectral element based approaches since they provide the capability of accurately capturing curved complex geometries while maintaining unsteady flow features for far longer than current commercial tools. We will demonstrate the application of these tools to Formula One geometries and a road legal track car by Elemental.