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Developments and Approaches in Turbulence Modelling for External Aerodynamics of Automobiles

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Abstract: Computational modelling becomes the state of art of dealing with various digital platform solutions to solve any engineering problems. Simulations with computational fluid dynamics (CFD) made possible to deal fluid dynamics and heat transfer flow problems. Substantial advancements are immediately found in automotive industries because of a reduction in design cycles and use of simulations techniques. Turbulence in automobiles is a common process of occurrence that produced with every shift in vehicle shapes. Significant advances in turbulent modelling and procedures made possible through validation by visualizations and other experimental techniques. To understand the flow features of turbulence, various modelling techniques have made available for varied length scales. This chapter summarizes the developments made for turbulence modelling approaches used in CFD simulations in particular to external aerodynamics in automobiles.

Keywords: Computational Fluid Dynamics, External Aerodynamics, Turbulence Modelling, Automobiles

1. Introduction

Automobiles such as car, buses, vans, trucks, on road normally move at high speeds that lead the flow medium to become turbulent. As the vehicle speed increases, the flow's motions changes and get affected by aerodynamic drag, unwanted noise, instabilities. This makes the foremost concern for every aero dynamist to capture and study every scale of the turbulent flow phenomenon such that it leads to enhancement in fuel economy and global crisis. Present scenario uses the digital technology to enhance the performance in every active and passive systems use in the vehicles. The process starts with the generations of computer-aided designs (CAD) models to simulate it