عنوان مقاله:

Numerical and Experimental Investigation of the Flow over a Car Prototype for the Shell Eco Marathon

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خلاصه مقاله:

The Eco-Marathon is a challenge organized by Shell in which student teams compete in designing energy-efficient vehicles. The event spark debate about the future of mobility and inspire engineers to push the boundaries of fuel efficiency. The aim of the present work consists of the numerical and experimental investigation of the aerodynamic performance of a Shell Eco Marathon prototype designed by a group of students of the University of Cassino, Italy. The car design has been provided by means of detailed ۳D CFD modelling with Comsol Multiphysics®. The numerical tool has been validated against experiments conducted at the Laboratory of Industrial Measurements (LaMI) of the University of Cassino. In particular, a scale model of the car has been investigated in an open chamber wind tunnel by means of the Particle Image Velocimetry (PIV) technique, for different free stream velocities within the range ۱۱ – ۲۳ m/s. Measurements have been associated to a proper uncertainty analysis. The experimental data has been compared to numerical results obtained employing different turbulence models and the validated numerical tool has been applied to the simulation of the full-scale car model, allowing to analyse the wake flow structures, and estimate .the overall drag coefficient

کلمات کلیدی:

Drag coefficient, Shell eco marathon, Wind tunnel, Particle image velocimetry, Wake flow, Numerical simulation