Numerical Modeling of External Flow Field and Experimental Test of Drag for Go-Karts

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ABSTRACT

The main objective of this study is to investigate the external flow field and drag coefficient for Go-karts, by using both numerical modeling with a computational fluid dynamics package and the measurement of the drag coefficient with a scaled model in a wind tunnel. At first, a 1:8 scale model was used in a wind tunnel test to measure its drag coefficient and to conduct flow visualization. The experimental data was then used to select the most suitable turbulence model for the simulation of Go-kart aerodynamics. Finally, the chosen turbulence model and the computational procedure were used to investigate important factors that influence the drag coefficient of a Go-kart, such as the Reynolds number, the design of the front panel, the orientation angle of the chassis, and the pose of the driver. Comparisons of the experimental and numerical results show that turbulence model gives the best agreement with the measured data. By extending this turbulence model to higher Reynolds numbers, complete curves of drag coefficient were presented which cover the parameter range for real applications. New phase designs with the consideration of drag, especially the change of the front fairing and the front panel, showed obvious reduction in the drag when compared to a commercially available Go-kart. Among the investigated parameters, both the angle of the front panel and the distance between two carts have significant influence on the drag. The influence of the driver ’ s pose is uncertain, depending on the resulting pressure distribution.

Keywords : Go-kart ; numerical modeling ; wind tunnel test ; drag coefficient

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