

Improvement of the Aerodynamic Behaviour of a Land Rover Discovery 4 in Turbulent Flow Using Computational Fluid Dynamics (CFD)

Authors : Ahmed Al-Saadi, Ali Hassanpour, Tariq Mahmud

Abstract : The main objective of this study is to investigate ways to reduce the aerodynamic drag coefficient and to increase the stability of the full-size Sport Utility Vehicle using three-dimensional Computational Fluid Dynamics (CFD) simulation. The baseline model in the simulation was the Land Rover Discovery 4. Many aerodynamic devices and external design modifications were used in this study. These reduction aerodynamic techniques were tested individually or in combination to get the best design. All new models have the same capacity and comfort of the baseline model. Uniform freestream velocity of the air at inlet ranging from 28 m/s to 40 m/s was used. ANSYS Fluent software (version 16.0) was used to simulate all models. The drag coefficient obtained from the ANSYS Fluent for the baseline model was validated with experimental data. It is found that the use of modern aerodynamic add-on devices and modifications has a significant effect in reducing the aerodynamic drag coefficient.

Keywords : aerodynamics, RANS, sport utility vehicle, turbulent flow

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