عنوان مقاله:

Numerical and Experimental Enhancement of the Aerodynamic Performance of a Road Vehicle using Passive Flow Control

محل انتشار:

دوماهنامه مکانیک سیالات کاربردی, دوره 16, شماره 7 (سال: 1402)

تعداد صفحات اصل مقاله: 13

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خلاصه مقاله:

This study focused on reducing the drag force of a road vehicle using passive flow control. The aerodynamic performance of the model vehicle was improved by applying originally designed vortex generators. The drawing data of the model vehicle and vortex generators were designed in the Solid Works® program. The drag force measurements and flow visualizations were performed in the Fluent® program with the Reynolds numbers in the range of ۲.۸×۱۰۵-۶.۶×۱۰۵. Accordingly, the CD value of the base model vehicle decreased by ۶.۲۲%, ۴.۵۹%, ۳.۳۸%, and ۳.۰۴%, respectively, using the originally designed vortex generator. This aerodynamic improvement rate can decrease the fuel consumption of vehicles by up to ۳.۳% at high vehicle speeds. To verify the highest numerical drag reduction, the model vehicle and vortex generators were produced in a ۳-D printer. The vortex generators were mounted on the vehicle models with the lowest CD value as in CFD analysis. The wind tunnel tests were conducted under the same test conditions for two vehicle models. It was determined that the experimental results supported numerical drag reduction.

کلمات کلیدی:

Aerodynamic, CFD, Drag coefficient, Vortex generator, Wind tunnel