

Passive and active systems of aerodynamic resistance reduction for automobiles that generate electricity SERB ARR-01

To reduce fuel consumption of conventional automobiles and to increase the autonomy of electric vehicles, it is important to develop measures to reduce air resistance. The measures taken nowadays to achieve an aerodynamic automobile body can lead to significant reductions in fuel consumption and on the other hand, these measures impose the reduction of the vehicle useful volume by minimizing the transversal section especially in the rear area.

Additionally, besides the effect of reducing air resistance, active new devices allow the production of usable electrical energy through the action of the aerodynamic resistance forces, energy which can be stored in the automobile batteries.

With the new solution to reduce air resistance, it is not necessary to minimize the transversal sections in the back and automobiles can be achieved with a maximum useful volume.

In case of a classic automobile, with the new system to reduce air resistance applied, we could obtain a reduction in the fuel consumption by about 10 - 30%. Maximum reduction is obtained at high running speed. The new type of system for reducing aerodynamic resistance can generate the power necessary for servicing the automobile further reducing consumption.

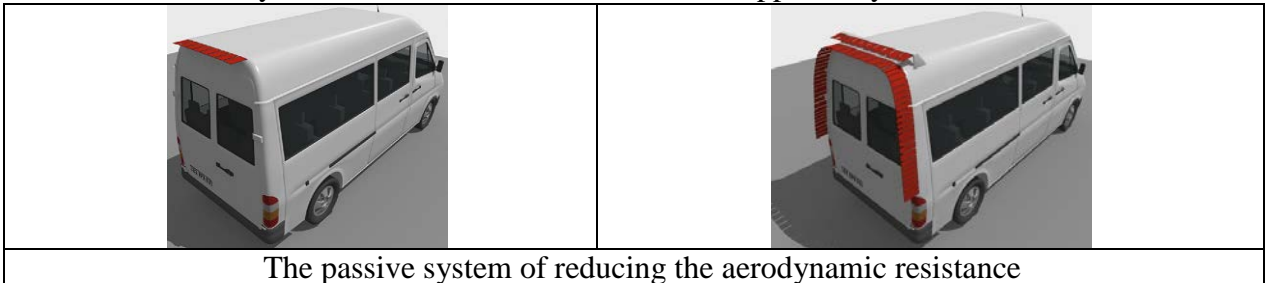
In the case of the electric automobile, the new type of devices could decrease the energy consumption due to reduced air resistance and also can produce electricity while moving. The new electric automobiles, with new type of devices will have more autonomy with about 20 - 40% compared to the current electric cars. The basic idea is to make the aerodynamic resistance forces to produce energy during the automobile runtime, without increasing the aerodynamic resistance.

Another advantage of using active system devices to reduce the aerodynamic resistance of automobiles is given by the fact that it can be used to increase maneuverability of the vehicle in conditions of low adhesion to the road.

The passive system of reducing the aerodynamic resistance

Functionally, the passive system of reducing the aerodynamic resistance is similar to an eagle's opened wings.

The system is made of several packages of thin slats that have different lengths. The packages of stiffness variable to the length are fixed at predetermined distance from each other by a plate which is mounted on the rear body sides, at a certain distance from the upper body.



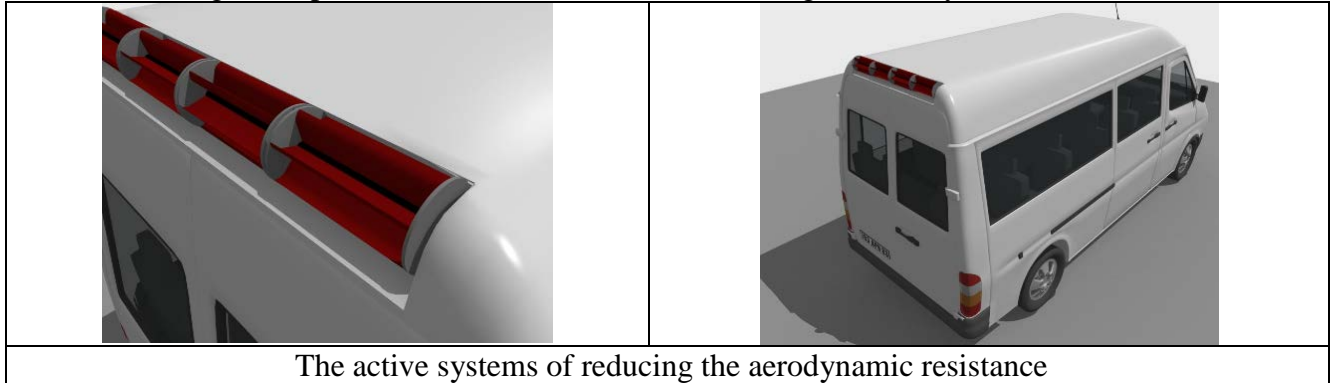
Air flows and the pressure difference between the inside and outside of the slats packages allow a normal air flow that creates an aerodynamic air flow with minimum disturbance. Because of these effects, the turbulence and the rear depression decreases, reducing the aerodynamic resistance force.

By fitting the passive system of aerodynamic resistance force reduction, the reduction of the useful volume of the automobiles is not essential anymore by reducing the rear cross section and no longer requires a convex shape on the top which generates a rising force due to the effect of suction (the Coanda effect).

The active systems of reducing the aerodynamic resistance

The active systems of reducing the aerodynamic resistance consist of a cylindrical turbine mounted in a cylindrical body of the sector. The entire system is mounted on the rear sides of the automobiles body.

The air flows that move the turbine replace the friction between the vehicle body and the air flows, by rotating the turbines. The air flow that passes through the turbine is disposed in the rear part of the vehicle, reducing the depression in this area, therefore reducing the aerodynamic resistance.



In parallel with the active systems and at a certain distance from these, above automobiles, a passive system can be installed which has the role of directing the air flow through the cylindrical turbines and reduce the rear turbulences.

In the case of using active and/or passive systems of reducing the aerodynamic resistance, a reduction in the fuel consumption of 10%-40% can be acquired, depending on the type of vehicle. The electric motor systems using active systems present an optimum between the reduction of the forces of aerodynamic resistance and the electricity production to be used to power car engines.

The usage of the proposed solution for electric vehicles contributes to the solving of the most critical issue: the increase of their autonomy. The system proposed can increase the running speed of the electric vehicle without a significant increase in consumption. Applying this solution leads to an increase in autonomy for electric vehicles of 20% - 50% , as well as an increase of the running speed, the safety and the vehicle's handling.

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