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ACTIVE SPOILER WITH INTEGRATED BRAKE COOLING

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ACTIVE SPOILER WITH INTEGRATED BRAKE COOLING CHANNEL

Technical task:

The object of the technical innovation is to optimize the air resistance coefficient and the brake cooling by means of an active control.

Initial situation:

According to the current state, the wheel spoiler is located directly on the wheel arch shell on the vehicle and, due to its aerodynamically favored shape, is used to optimize the air resistance coefficient („cW value“) and also has a protective function against stone impacts and similar environmental influences.

Such wheel spoilers are made of TPE (thermoplastic elastomer) and installed as a rigid part in the vehicle.

Brake cooling ducts (BKK) are implemented in current series vehicles by cooling channels positioned in front of the wheel arch liners. The air is thereby deflected from the road upwards towards the brakes. A further prior art is the brake cooling by means of an air guide, which is designed as a connection between the wheel arch shell and the bumper. The advantage here is the direct inflow with thus higher kinetic energy of the air stream.

However, such brake cooling ducts influence through their opening the air resistance value of the entire vehicle. Particularly at higher speeds, this results in a significant increase in the air resistance. Due to the air inflow of a brake cooling duct located in front of the wheel arch shell, energy is lost as a result of the change in the altitude level. As a result, the brake is not cooled to the maximum possible level.

Solution:

The technical innovation deals with the optimization of the cW value in a range of $\Delta 011-0.015$ (depending on the vehicle).

The wheel spoiler is driven downwards by an actuator to divert the air flowing to the tire. Due to the translational movement of the spoiler, the combination can be used with a brake cooling channel. The brake cooling channel opens in the retracted state (<80km / h, wheel spoiler in the direction of the vehicle) and serves, for example, for downhill slopes for optimized brake cooling. The air is directed to the brake by a separate guide channel. In the extended state (> 80km / h, wheel spoiler towards the ground) the brake cooling channel is closed. Thus, the increase in the cW-value at high speeds is lowered again.

Technical implementation:

The assembly is located in front of the wheel arch and behind the bumper. The actuator movement is made possible via a connection to the vehicle electrical system. At speeds below 80 km / h, the wheel spoiler is in the retracted state. The brake cooling channel is open at this moment and thus active. The brake is cooled by the air introduced by the bumper. The wheel spoiler can be used for journeys over 80 km / h (trigger speed can still be adjusted). The travel distance in the Z direction is dependent on the vehicle level of the respective vehicle type.

Advantages:

- Improvement cW value
- Improvement brake cooling
- Increase maximum range (in km)
- Reduction of CO2 emissions

Possible application:

- All vehicles..

Technische Neuerung

