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Modern technology improving safety in automotive vehicles

The article presents the basic safety systems used in cars. Discusses the anti-lock braking (ABS) system useful in cornering (ESP) and anti-skid system at the time of starting (ASR). Article shows the importance of knowledge of these issues, giving drivers sense of security. The authors of this text will, point out that modern technical solutions improving safety in motor vehicles should be analyzed as part of general technical school education.

Introduction

The development of technology affects the automotive industry, and hence communication. It allows to eliminate many dangers and threats, eg reduction of air pollution from exhaust fumes, excessive noise and accidents in road traffic. In addition, many accidents are caused by human fault. To eliminate this, scientists invent and implement many solutions such as drivers assistance to help them drive a car. The use of computer systems in cars definitely increases the precision and speed of control. It allows you to perform maneuvers so far impossible to implement. At the same time, these systems increase the comfort and safety among road users.

This study covers the basic safety systems in cars. They are anti-slip braking system (ABS) and ESP (Electronic Stability Program) system useful for turning and helping in eliminating slips

Description and operation principle of the ABS system

The ABS system is a system that prevents the wheels from locking when braking. Sensors control the wheels' rotation and when one of them rotates slower than the others, it reduces the braking force. The ABS system is designed to keep the wheels slipping at the appropriate level. What to counteract the loss of stability during braking, maintain the possibility of steering the wheel and shorten the braking distance. The latter is not always possible. ABS prevents wheels from locking and pulling the car aside and losing control of the car.

In a vehicle equipped with this system, the best way to brake is to press the brake and clutch at the same time. This prevents the engine from shutting down, and thus the correct operation of all driver assistance systems, such as braking assistant, track control, power steering. The sensors control the wheel speed and if one of them rotates differently, the ABS system reduces the braking force. This safety system makes the car manageable and has the ability to maneuver on a slippery road. This system is able to brake the wheels of both the front and rear axles, helping the driver to precisely drive the car through the slippery surface. This is extremely important for today's traffic, especially in winter conditions.

If the car is equipped with ABS, we should brake continuously. When the system turns on, you hear a sound similar to hammering a wheel. We also feel pulsing under the brake pedal. Sometimes he puts up strong resistance. The brake should not be released then, because the car will not stop.

When using emergency break, it's important to press the brake pedal as much as possible and do not let it go until the car stops.

ABS is built from wheel speed sensors (at each wheel), most often magneto induction, cooperating with toothed discs on wheels or special bearings, individual pressure modulators for each wheel and system management controllers.

Operation of the ESP system

The ESP (Electronic Stability Program) system is particularly useful when negotiating sharp corners, which allows you to eliminate slip. When the sensors detect slip, the electronic system brakes one of the wheels, allowing the direction of travel to be maintained. ESP also controls the engine by reducing gas. The ESP system corrects the dangerous situation which may be the oversteer by the car, that is narrowing the bend and understeering, ie the phenomenon of bending the bend. Dangerous acceleration around the vertical axis is recognized by a very sensitive speed sensor. The response time of this device is 20 milliseconds, which makes the detection of the slip much earlier than even an experienced driver would have done.

- ESP allows a much safer driving, however it does not mean that the driver does not have to show his skills, common sense and imagination. The ESP system is a combination, including ABS, ie the electronic brake force sharing system, ASR, or track control system, and braking assistance.
- ESP consists of two central microcomputers that deal with calculations and control each other and many sensors that measure, among others, the speed of each wheel, steering angle, car acceleration, brake fluid pressure, rotational speed around the vertical axis, vehicle speed, gear ratio gearbox and torque. It is also important to use information such as a car weight, tire pressure and tread.
- ESP is mainly useful on a slippery surface, but it is also useful when you need to make a violent movement of the steering wheel to avoid an obstacle. A car without this system can then even roll over.

The principle of ASR

The system preventing the wheels from slipping when starting is a great facilitation for the driver – ASR (Acceleration Slip Regulation). The system works by blocking the wheels when one of them starts to spin when others are stable. In this way, it controls the sliding of the wheels. This invention has a special application in winter, when starting, driving uphill and accelerating in corners.

ASR is similar to ABS. One of the difference between these system is that the speed of the driven and non-driven wheels exceeds the permissible value, the drive torque supplied to the wheel axle of the vehicle is reduced.

Modern ASR systems use the braking system. This is due to the high inertia of the engine control. The use of brakes increases the efficiency of the system. The ASR system must be able to control the engine regardless of what the driver does. Therefore, the engine control can not be controlled by a mechanical connection to the accelerator pedal. Therefore, an additional damper is used. The mechanical system is replaced by an electronic system consisting of an accelerator pedal position sensor, a controller and an executive engine.

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Nowoczesne rozwiązania techniczne poprawiające bezpieczeństwo w pojazdach samochodowych

Abstract

Modern facilities that control car security systems are becoming more and more common. Their possession increases the safety of both driver and passengers as well as other road users. However, one should remembered that no support system for the driver of a motor vehicle alone will protect us from an accident. Always, apart from having information about system activities in the used car, it is always necessary to have reason and imagination.

Key words: ABS, ESP, ASR, slip system, car driving system

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