

ABS Antilock Braking System

The automotive engineering system to control the wheel slip



Antilock Braking Systems are designed to optimize braking effectiveness while maintaining car controllability. The ABS model is driven by a flat DC motor steered from a PC. There are two encoders measuring the rotational angles of two wheels. At the beginning of an experiment the wheel simulating the relative road motion is accelerated to an assumed threshold velocity. The car wheel accelerates following the rotational motion of the imitating road wheel. If the threshold velocity is achieved a braking procedure starts. If the car wheel becomes motionless it means that it remains in slip motion (the car velocity is not equal to zero) or it is absolutely stopped. The less the slip the better is car control. One of the pre-programmed slip control algorithms can be applied. The results of this experiment are shown in the figures below.

Hardware:

- mechanical unit: rigid frame, double wheel, DC high-torque flat motor, electromechanical brake and shock absorber
- position sensors: incremental encoders
- interface and power supply unit
- RT-DAC I/O internal PCIe or external USB board (the PWM control and encoder logics are stored in a XILINX chip) or the single board RIO or a PLC

Dimensions: 480x370x540 mm

Result of experiment; slip=20%; bang-bang control

