

DIVE INTO ANTILOCK BRAKING SYSTEM

SANDEEP CHOWDARY VYTILA

Abstract -AntiLock Braking System(ABS) is one of the Advanced Driver Assistance Systems(ADAS) features which comes under active safety.It is used in almost all modern vehicles. It is implemented in almost all the vehicles now-a-days as safety is the utmost priority for the passengers.As the name suggests, this system prevents the wheel from locking up and reduce stopping distance of the vehicle, thereby offers improved vehicle control which then allows the driver to steer the vehicle properly when brake is applied abruptly. The slippage of the vehicle having ABS is very less when compared to the slippage occurred through conventional braking.

Key Words:ABS, ADAS features, locking, stopping distance, slippage, Malfunction Indication lamp.

1.INTRODUCTION

ABS operates much effectively and at a faster rate.When a fault exists in any of the components of ABS, usually a Malfunction Indication Lamp will be illuminated on the instrument panel which warns the driver that the ABS feature will be disabled until the fault is cleared/removed.

To properly understand ABS, understanding the principles of steering and braking is prior.When you apply brake pedal ,the brake pads on the wheel discs will be activated and will be pressed against the discs. This will stop rotation of the wheels.As the wheel stops rotating, this causes slippage between road and wheels and the vehicle stops due to the friction.

2. Body of Paper

ABS comes into picture when there is an unexpected deceleration in the wheel. There are four main components of ABS: Wheel speed sensors, Controller, valves and pump.There is a speed sensor attached to each wheel which indicates the speed of respective wheel.The controller monitors and receives information from each wheel individually.It looks for deceleration in the wheel .When it experiences a rapid deceleration the wheel locks up.When the wheel is about to lock up, the modulator unit releases the brake pad on the wheel.This way the wheels will be allowed to spin during braking instead of locking up.

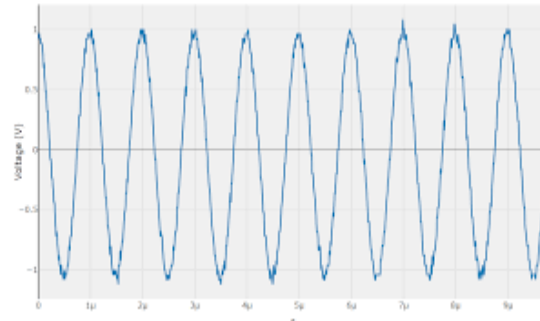


figure a)sinusoidal signal

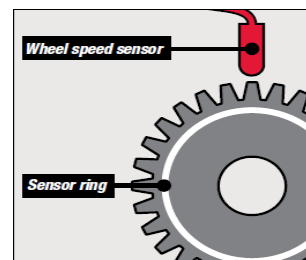


figure b)Toothed Ring

3. CONCLUSION

After going through this, you might end up with a question “How does the controller knows that there’s a rapid deceleration.The wheel speed sensors uses a magnet, Hall Effect sensor and an electromagnetic coil to generate a sinusoidal signal(refer figure a). A magnetic field is induced around a sensor during the wheel rotation. Whenever the toothed ring(refer figure b) passes the sensor a voltage is shown. There are air gaps too on the toothed ring and when they pass the voltage drops down.So when the voltage drops down abruptly and wont increase further ,this indicates that the wheel is not rotating.This is how the controller identifies deceleration and this is when the “ANTILOCK BRAKING SYSTEM” feature comes into picture.

ACKNOWLEDGEMENT

I would like to thank myself who rarely steps out of my comfort zone and ‘inner me’ for pushing the ‘outer me’ to write this, who always thinks of stuff I should work on.

REFERENCES

1. https://en.wikipedia.org/wiki/Anti-lock_braking_system
2. <https://stackoverflow.com/questions/49778904/how-to-plot-a-continuous-sine-wave-in-python>
3. https://www.google.com/search?q=wheel+speed+sensor+diagram&rlz=1C1CHBF_enIN732IN732&sxsrf=ALeKk03cSDU5wJm0Eeg7qrqnpGfm_b-uXJA:1598546079415&source=lnms&tbm=isch&sa=X&ved=2ahUKEwjaw-GZ6LvrAhWVF3IKHYA5DA4Q_AUoAXoECA4QAw&biw=1366&bih=608#imgsrc=eGYD6z8f0ySWtM&imgdii=-EsnKYG4NxNoyM