

## A study over break system employ in the car means

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### ABSTRACT

In the last few decades, there have been extensive studies on analysis and investigation of brake done by many researchers around the world. This paper aims to focus on study the various brake system its material and futuristic way to employ it in better **Brakes** is a part of machine device used to stop the motion of that machine or to slow down the machine. Brakes are commonly used in vehicles to stop the moving motion of a vehicles device.

### INTRODUCTION

According to an article 'It is a mechanical device that inhibits motion object or preventing its motion. Brakes are very important and are available almost in every wheeled vehicle. It is very much used in rotating axle's parts or wheels. **DEFINATION OF BRAKES BY 'CHRIS WOODFORD'**:- According to Chris Woodford, 'Brakes termed as the power of science'. According to his point of viewing brakes he says or explains that:- You're driving along quite happily when all of a sudden a dog runs out into the road just in front of you .You have a split second to react to what's happened. When you stamp on the brakes, you confidently expect they'll bring you to a halt in time. How can you be so sure? Because brakes use the power of science and thankfully, for most part science doesn't let us down!

#### Types of Brakes

Brakes are of following three types:-

1. Hydraulics brakes or pumping brakes.
2. Electric or electromagnetic brakes.
3. Mechanical brakes or frictional brakes.

**PUMPING BRAKES:** - Pumping brakes are used where the machinery system of pump is used .As its names indicate this pumping brake is used where the hydrogen is used is used mostly these brakes are used to stop the motion of floating water in any mechanical device where works related to hydrogen is used.

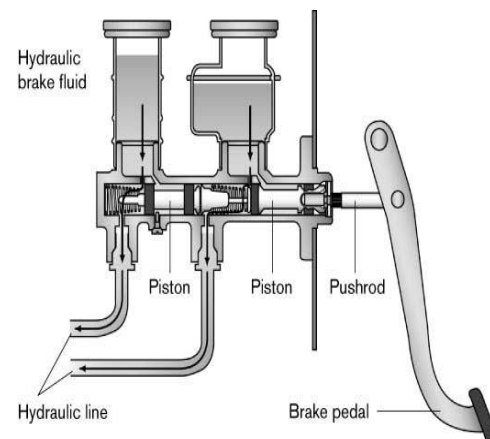


Fig: 1

#### ELECTROMAGNETIC BRAKES:

Electromagnetic brakes were used where electric motor or any other electric machinery parts are used. For example – Electric motor, it is used in hybrid gasoline or in electric vehicles as a generator to charge batteries of electric vehicles and also as regenerative brakes.

**FRICTIONAL BRAKES :-** These brakes are most common brakes and are divide broadly into two groups according to the direction of force:-

**1. RADIAL BRAKES:** - Forces acts in radial direction in mechanical devices are known to be radial brakes. These brakes must be subdivided into internal or external brakes .Ex:- shoe brakes or drum brakes.

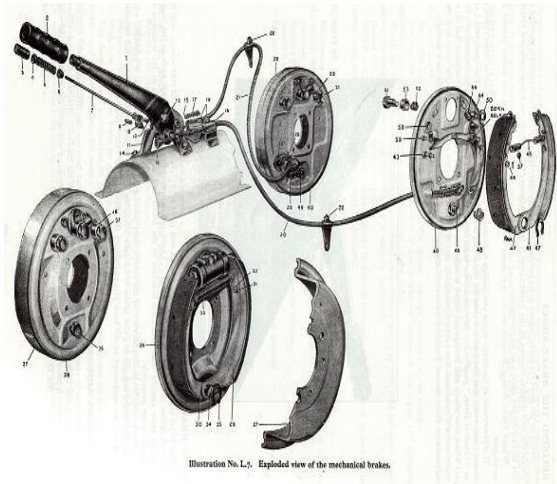


Fig 2: 1. Radial brakes      2. Axial brakes

**SHOE BRAKES:** - A shoe brakes consist of a block or shoe which is used for pressing. This shoe is made of a soft material. In railway trains we can see shoe brakes used. Friction which causes tangential braking force acts in between wheel and block which retards the motion of wheels. One end of lever is being pressed by the block which is rigidly fixed and other end is pivoted on a fixed fulcrum.

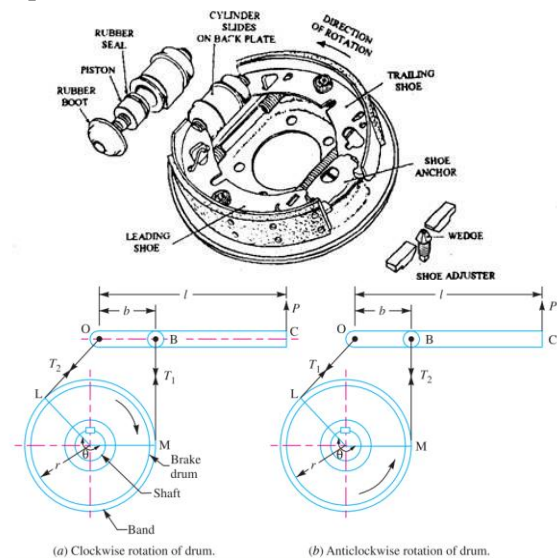


Fig:- 3

**DRUM BRAKES:** - A rotating drum which is used to expand to rub the inside of a drum with shoes is called drum brakes. This is a vehicle brake and friction is caused by a set of brake shoes that press the inner surface of drum which is used to be rotated here. Here drum is attached with rotating road wheel.

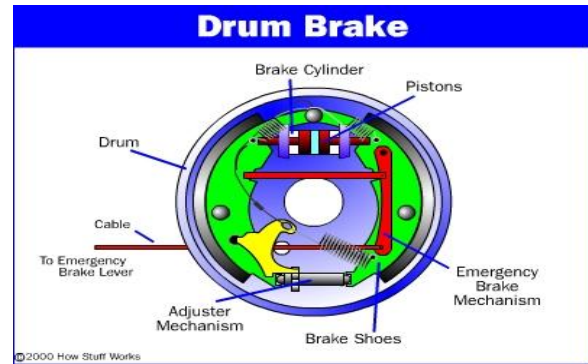


Fig: 4

**2. AXIAL BRAKES:** - In axial brakes, forces acts in axial direction in the brake drum. Analysis of axial brakes can be similar to clutches. Ex: - Disc brakes, cone brakes etc.

**DISC BRAKES:** - Rotating disc that were being pinched by some pads are called disc brakes. and are used for stopping or slowing wheel motion. Frictional material in the form of brake pads is forced hydraulically, mechanically against both sides of disc

**DIFFERENT BRAKES FOR DIFFERENT MACHINES:** - Brakes plays a very important role and works in a similar way on almost different vehicles like cars, trucks, trains, airplanes etc.

Here are some mechanical devices and some types of brakes used in them are as follow:-

**BICYCLE:** - If we want to stop the bicycle suddenly we squeeze the brakes on the handle. On the back and front wheels thin metal cables are running which are used when pulled on small calipers forcing thick rubber blocks to press against the wheels. As this happen, friction between metal wheel and blocks generates heat and reduces kinetic energy and safely stops your bicycle.

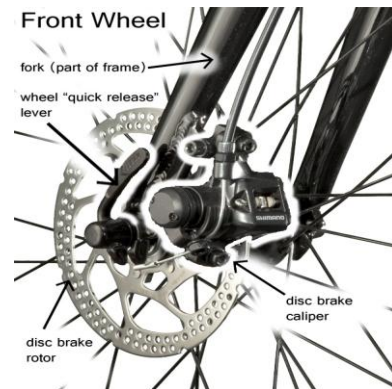


Fig: 5

**MOTORCYCLE:** - Disc brakes with a rotor and a brake blocks are used in motorcycles.

**AIRPLANES:** - Airplanes have their brakes inside their wheels which help them to stop on the runway and they also uses airbrakes to increases their air resistance.

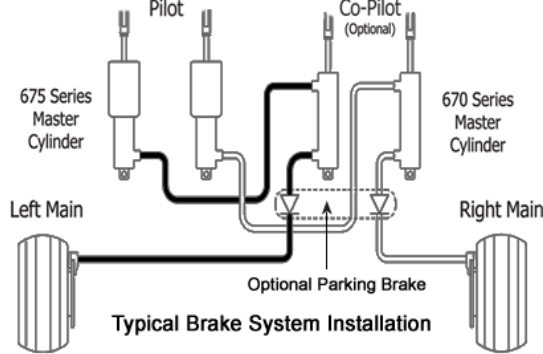


Fig: 6

## 2. LITERATURE SURVEY

**Bo long at el.** In this paper, we have analyzed a hybrid power supply system composed by UCs and batteries for extending the one time charging driving mileage and energy recovery efficiency of EVs. The main objective of this paper is to provide a practical DC-DC converter and an optimal energy management control scheme. Based on that, stability, dynamic response, and a design procedure for  $H_\infty$  are put forward. The experimental results demonstrate that when using the proposed energy-management scheme and the proposed  $H_\infty$ , a vehicle can acquire more braking energy (about 5.3%) than with a conventional PID controller under the same conditions.

Future work includes the calculation of the energy allocation scheme for two or more energy saving components, where parameter variations of the buck-boost inductance and capacitance of the ultra capacitor pack should also be taken into account and this is left for future investigation.

**Chankit jain et al.** Antilock braking systems are used in modern cars to prevent the wheels from locking after brakes are applied. The dynamics of the controller needed for antilock braking system depends on various factors. The vehicle model often is in nonlinear form. Controller needs to provide a controlled torque

necessary to maintain optimum value of the wheel slip ratio. The slip ratio is represented in terms of vehicle speed and wheel rotation. In present work first of all system dynamic equations are explained and a slip ratio is expressed in terms of system variables namely vehicle linear velocity and angular velocity of the wheel. By applying a bias braking force system, response is obtained using Simulink models. Using the linear control strategies like PI-type the effectiveness of maintaining desired slip ratio is tested. It is always observed that a steady state error of 10% occurring in all the control system models.

**Yousif et al.** It is now generally accepted that brake squeal is caused by friction induced vibration (Blashchke et al). There are two major hypotheses in explaining the phenomenon: the first is that the squeal is due to stick-slip phenomenon at the friction interface, while the second attributes that the squeal is due to INTERNATIONAL JOURNAL OF SCIENTIFIC & TECHNOLOGY RESEARCH VOLUME 2, ISSUE 4, APRIL 2013 ISSN 2277-8616 69 IJSTR©2013 [www.ijstr.org](http://www.ijstr.org) the geometric coupling of the brake assembly. Complex eigenvalue analysis is in widespread use and no doubt time domain analysis will follow with increase the computational power and reductions of the cost. Experimental work on a disc brake system also indicated that the rotor is the resonant member, vibrating in transverse modes with diametral nodes, where the mode travels around the disc in a uniform rate. The rotor was responsible for the most noise and primary radiator to the sound since the rotor area is larger than other brake parts. The speed of rotation depends on the frequency and mode order. The amount of squeal increased when the natural frequencies of the pads, calliper, and brake rotor were close to each other. That closeness of these frequencies is not a necessary condition for squeal generation, because many other parameters play an important role in generating brake squeal. Many of the analysis were done by using complex eigenvalue approved that the result was gotten from FEM is close to the experiments.

**Amr M. Rabia et al.** From the number of papers that have been published and summarized in this review, it is suggested that disc brake noise and vibration still continues to be a major concern for the automotive industry despite the efforts to reduce its occurrence during the past decades. Experimental methods will still play an important role for a number of reasons. Firstly, they offer more effective analysis tools than numerical methods. Secondly, diagnosis of the cause of brake vibration problems can often only be found by experimentation. Moreover, they can provide real measured data and they are trustworthy. Finally, the verification of solutions to noise and vibration problems can be achieved through experimental tests under different braking operating conditions. The previous experimental results reveal that there are numerous factors that influence the occurrence of vibration and noise in automotive disc brakes including materials and geometry of brake components, component interaction and many operating and environmental condition. All of these issues suggest that there is a strong need for further research to enhance our understanding of various parameters behind vibration generation.

### 3. CHARACTERISTICS OF BRAKES

Brakes must be of good quality as it plays a very important roles in our daily life , and following are some characteristics termed for brakes are as under :-

1. Coefficient of friction should remain constant with change in temperatures.
2. It must have of high heat resistance.
3. It must be of low wear rate.
4. It must have adequate mechanical strength.
5. It must not be affected by moisture and oils.

### 4. PROPERTIES OF MATERIALS FOR BRAKING LINING

### 5. RESEARCH DONE ON BRAKES OF A CAR

Cars have four wheels, so brakes were also applied on almost every four wheels for slowing or stopping the motion of a car. Many

| MATERIAL FOR BRAKE LINING | COEFFICIENT OF FRICTION |           |            | ALLOWABLE PRESSURE |
|---------------------------|-------------------------|-----------|------------|--------------------|
|                           | DRY                     | GREASY    | LUBRICATED |                    |
| CAST IRON ON CAST IRON    | 0.15-0.2                | 0.06-0.10 | 0.05-0.10  | 1.0-1.75           |
| FIBRE ON METAL            | -                       | 0.10-0.20 | -          | 0.07-0.28          |
| LEATHER ON METAL          | 0.30-0.5                | 0.15-0.20 | 0.12-0.15  | 0.07-0.28          |
| METAL ON CASTIRON         | -                       | -         | 0.05-0.10  | 1.4-2.1            |

cars have some different types of braking system. Some four wheelers vehicles use disc brakes on the back two wheels. In case of disc and brake block cars sometimes uses shoes to press outwards the hollow wheel hub as it pushes , frictions slows your cars. A car with full speeds has lots of energy and when we used to stop the car, all of its energy is converted into heat in pads-brakes. Brakes can be heated by the temperatures all about 500 C ( 950 F) or more ! So, brakes are made of hard materials that won't melt by the temperatures. Such a materials are – alloys, composites etc.

## 6. BRAKING SYSTEM

### 7.

Braking system was invented by JOHN STAWARTZ of **HOMESTEAD** in 1910. According to him: - When you pull on the brake lever a giant brake 'shoe' drops down under the back wheel. As the car drives into the shoe, the shoe teeth bite into the road and the car comes juddering to a halt.

**How Brakes Of A Car Works :-** In a car brakes are applied on almost every 4 wheels because of which it is necessary to stop at all 4 wheels to stop a car . If a car is moving in a fast speed, simply by pressing the brake by your foot, the brake will not generate enough force to stop all the four wheels. So to stop the car, by brakes we uses, 'Hydraulics '. Hydraulics is a system of fluid filled pipes that transmit the force double from one place to another. When the brakes pedals are pressed, the foot moves a lever that forces long the piston and cylinder filled up with hydraulics. As both cylinders get pinged by piston, it squirts hydraulics out by the help of pipe. These narrow pipes were positioned next to the all four car's brakes. As you apply the force to stop the car

in brake pedal, all the 4 wheels gets slow and stop. This hydraulics brakes were invented by MALCOLM LOUGHHEAD of DETROIT, MICHIGAN in 1919. And here is his one of the most improved designs from mid 1920s. He used the car's momentum to provide the force that pushes hydraulic piston; it was a kind of power assisted braking.

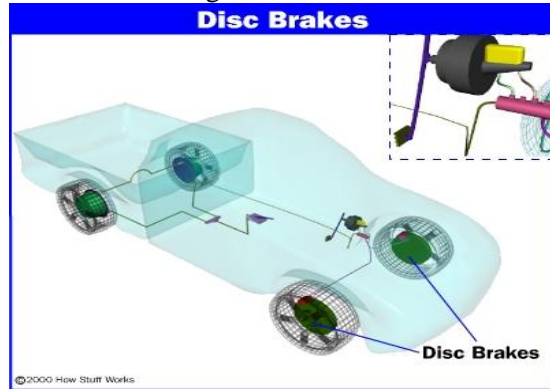


Fig: 7

**HANDBRAKES:** - Cars usually uses hydraulics braking system but instead of this all cars have a mechanical handbrakes which acts on two wheels usually on the rear ones. Handbrakes main purpose is as a parking brake. It gives limited braking, if the hydraulics system fails. It pulls the cable pair which is linked to brakes by the set of lever, pulleys. This acts on the shoes by means of a mechanical system.

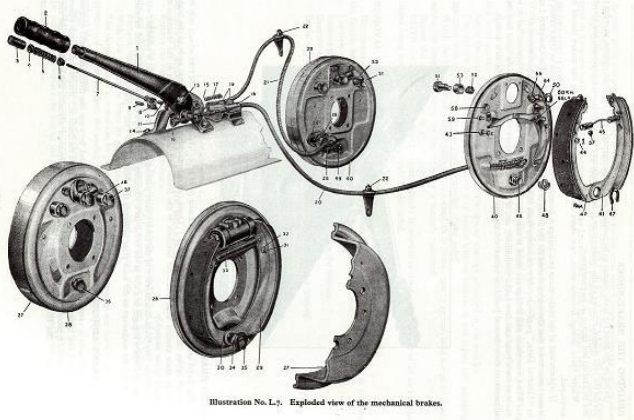


Fig: 8

**CONCLUSION ON RESEARCH ON CAR'S BRAKE:** - By studying we came to know that the cars brakes vary from one another. And many other cars uses mechanical system of braking, hydraulics system of braking. Each braking system varies from each other in processing. By doing research it is possible to make

another system which includes the studies based on electrical analysis to stop the motion of a car.

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