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DISTRIBUTION OF BRAKING FORCES BETWEEN CAR AXLES AND METHOD OF REDISTRIBUTING ITS MASS DURING BRAKING

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Abstract

In this article, improving the expertise of traffic accidents based on the study of the braking process of motor vehicles Methodology and research methods are presented through theoretical studies based on the theory of car movement, experimental studies of the car braking process in different operating conditions, taking into account the structural characteristics of the car wheel.

Keywords: Transport, friction force, movement, brake, process, basis, car, truck.

Introduction

In the Republic of Uzbekistan, the traditional methodology of motor transport expertise, which appeared on the basis of studies, is used. Among the main parameters describing the movement of the vehicle is its deceleration, which is currently determined only experimentally or selected in the study of vehicle movement parameters based on various road conditions and vehicle-oriented table values. categories. At the same time, in modern expert practice, the specific share of the use of the latter is significant, which leads to serious errors in the calculation [1].

Equations of projections of all forces on axes parallel and perpendicular to the path and equations of moments of all forces relative to point C are given.

$$F_1 = \frac{Ga\cos\alpha}{L+\mu h_i} \cdot \mu$$

$$F_2 = \frac{Gb\cos\alpha}{L+\mu h_i} \cdot \mu$$

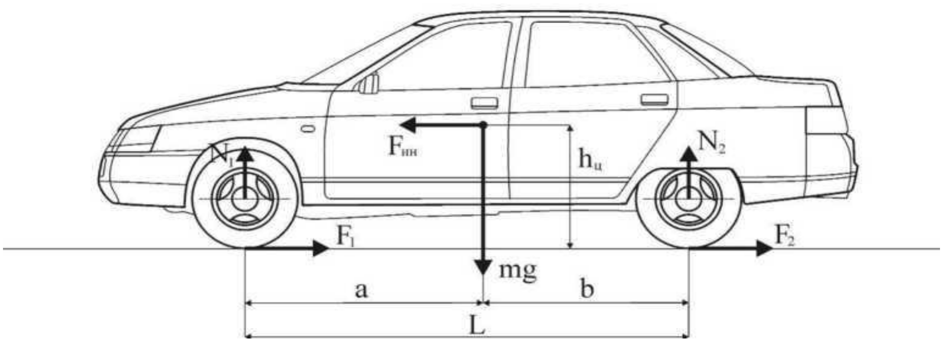

Figure - Diagram of the distribution of braking forces acting on the car.[2]

During braking, the mass is redistributed from the rear wheels to the front This increases the pressure on the front wheels on the road.

The appearance of the braking force (F1 + F2) on the front and rear wheels when the car is braking, resulting from the friction between the tires and the road This creates a torque that rotates the car around its center of gravity and tends to lift the rear end. As a result, a certain part of the total load mg 0 is redistributed from the rear wheels to the front. However, the lateral resistance of the respective forces causes another moment that balances the first moment emits So, based on the above, we get:

$$F_1h_i+F_2h_i = Fh_i = \theta L$$

The following follows from this[2]

$$\theta=\frac{Fh_i}{L}$$

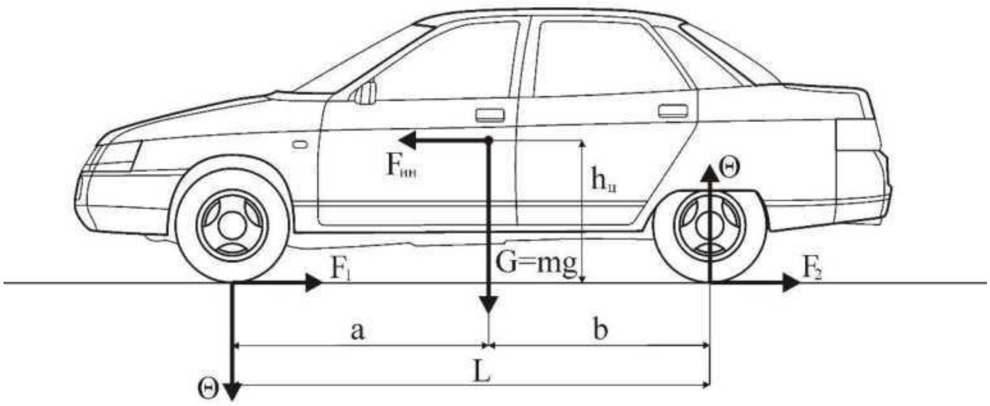

Figure - Scheme of redistribution of car mass during braking[2]

The total braking force at the initial point of sliding is given by, therefore

$$\Theta=\frac{\mu mgh_i}{L}$$

The above expressions can be taken into account when calculating the force balance of the car during braking, if it is necessary to calculate the movement of a certain tire during sliding on the road. There are many methods (experimental and theoretical) for determining the coefficient of adhesion of a locked car wheel to the road surface, but the experimental method is the most accurate [2].

Currently, almost all known methods and equipment in this field are used only to determine the grip properties of road surfaces. This is related to the need to assess the quality of the roads being built or used. However, at the same time, all these methods do not allow to fully simulate the braking or lateral movement of a car wheel on the road surface, which is relevant to such an important field of activity as the investigation of traffic accidents.

There are many different methods and instruments for experimentally determining the coefficient of friction. These methods can be divided into two groups:

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— direct measurement of adhesion coefficient;
— direct assessment of adhesion coefficient.

The first provides more objective information.

For direct measurement of the coefficient of friction, dynamometer carts, various portable instruments, laboratory benches, and finally the car itself, are used as a brake cart. Based on the analysis of the pros and cons of the used methods and devices, most researchers believe that the most reliable method is in the full wheel lock mode, when the tires slide on the surface with a constant speed and load, are not deformed around the circle and absorb minimal energy is a dynamometer method. .

Also, according to the principle of operation, existing devices can be divided into the following groups:[2]

1) pulled (dynamometric) principle (when the device is pulled by a tractor and takes measurements);

2) imitation (imitating the movement of a wheel tire on a supporting surface, but they are not structurally a wheel).

The principle of operation of the trolleybus: when it moves at a constant speed of 60 km / h, the trailer wheel is braked to a sliding position, and at the same time, the traction force (Traft) is determined based on the obtained value, the adhesion coefficient is calculated

$$\mu = \frac{F_t}{mg}$$

Here: T traction - traction force, N;

m - trailer mass, kg.[3]

Ties used to set the lateral adhesion coefficient create conditions for the rotation of the wheel under the influence of the transverse force, that is, they simulate the sliding phenomena of a car without brakes. Device schemes of such carts are presented. Practice shows that the use of these carts is justified, but it is suitable only for a narrow range of vehicles (GAZ-21, GAZ-24, Moskvich and VAZ), and also in some cases provides sufficiently accurate information can't. for the dynamometer method, since many modern analogues, in particular PKRS-2U, use a rigidly fixed wheel, as well as a system of blocking it during movement, which does not allow changing the initial data; in addition to the wheel load, tests are carried out on different types of wheels. Also, disadvantages include that they can't learn straight wheel and sideslip equally in the same setup. During the experiment, with the simplest determination of the viscosity coefficient, two cars (A and B) are connected by a dynamometer or dynamograph.

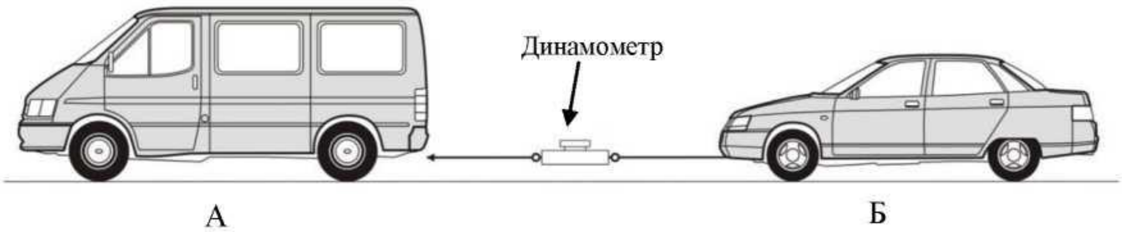

Figure. Determining the traction force and traction coefficient of a vehicle towing a stationary vehicle[3]

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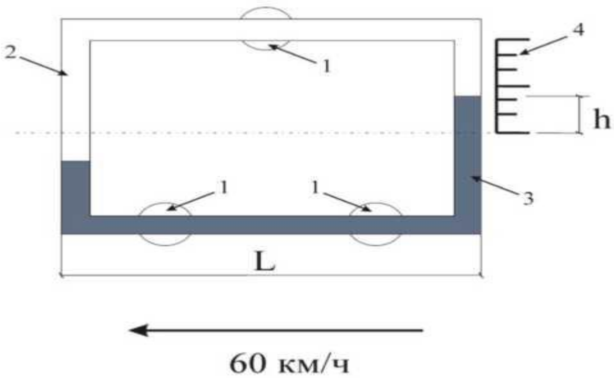
The first acts as a tractor, braking until the wheels of the towed vehicle are completely locked. After installation smooth movement of the tractor, measuring the indicators of the dynamometer. The value of the adhesion coefficient is determined from the formula. This method is more accurate than the previous one, and indeed others, because it allows you to study the coefficient of adhesion directly to the car itself with the help of a very accurate device - a dynamometer. However, this method has an important drawback when used in traffic research - it is not applied to vehicles that have sustained significant damage to other units or suspensions in a traffic accident that does not allow vehicles to move freely. It is also possible to measure the coefficient of friction from the maximum deceleration value, since it does not need to precisely maintain the speed of movement. Slowness is set using slowness meters [4]. The advantage of this method is that it takes into account the specific operating conditions of the car. When braking a car, the amount of deceleration depends on the strength of the sliding resistance. The coefficient of adhesion in the extension is calculated according to the formula derived from the formula.[4]

$$\mu=\frac{K_e \cdot j}{g}$$

where g is the acceleration of free fall m/s^2
j is the steady-state deceleration recorded by the decelerometer, m/s^2
Determination of adhesion coefficient using a pendulum decelometer.
The coefficient of adhesion is determined by the formula.[6]
Determination of the coefficient of friction using a hydraulic decelerometer.
The design of this device is shown.



Picture. Diagram of a hydraulic decelerometer

This device consists of a closed tubular circuit (2) with a scale (4) on rubber mounts (1) half filled with liquid (3). According to the deviation of the liquid level (h), a negative acceleration (deceleration) is determined, taking into account the inclination of the car, when the car is moving on a slide.[4]

$$\mu=\frac{2K_e h}{g \cdot L}$$

Here: L is the length of the hydraulic speedometer, m;
h - the amount of liquid level in adjacent pipes, m.

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To ensure safety, the optimum speed at which the vehicle should brake should be below 60 km/h, approximately 40 km/h and 30 km/h. In this case, it is necessary to take into account correction factors to determine the coefficients of friction.
This method has the same drawback as the previous one, which is the impossibility of testing on damaged vehicles. In addition, correction factors are included in the calculation, as well as the coefficient of braking efficiency, which, of course, does not clarify this method.

Summary

1. The most common types of accidents can be called: vehicle collisions (42.7%), pedestrian collisions (28.0%), overturned cars (8.0%). In 2021, the share of the number of accidents caused by vehicle technical failures2 more than doubled and amounted to 3.1% (2020 - 1.3%). preliminary analysis methods of conducting tests for this type of accidents showed limitations and provided an opportunity to improve the selection of initial data in the study of vehicle braking and also their production.
2. Currently, the method of determining the coefficient in our country
the clutch theoretically exists in unity and is incredibly close. This is because such a method does not take into account that not all wheels have the same contact with the ground, and when braking, the load is redistributed between the axles of the car.
3. Currently, the following friction coefficients are distinguished:
Coefficient of adhesion at rest, coefficient of adhesion during sliding or sliding;
coefficient of adhesion during lateral movement of the wheel, their differences and very little attention has been paid to the mechanics of formation in the interaction of the tire with the supporting surface. In addition, friction does not take into account the mode of the accident, where the contact surface of the wheels depends on various parameters. Therefore, the justification and integration of these differences allows the development of automotive braking research methods.

References

1. Abdubannopov, A., & Muydinov, S. (2024). The role of industrial robots in mechanical engineering and ways to create software for robots. Western European Journal of Modern Experiments and Scientific Methods, 2(1), 60-68.
2. Abdubannopov, A., & Abdumutalov, Y. (2024). Vehicle tyre pressure control and monitoring systems. Spectrum Journal of Innovation, Reforms and Development, 27, 14-19.
3. Abdubannopov, A., & Abdupattayev, S. (2024). Measures to protect the environment from the harmful effects of motor transport. European Journal of Emerging Technology and Discoveries, 2(2), 14-22.
4. Ismoilov, A., & Abdubannopov, A. (2023). Development of modern directions of driving training and recommendations for increasing traffic safety. European Journal of Emerging Technology and Discoveries, 1(9), 1-7.
5. Xaydaraliyev, O. Y., and A. A. Abdubannopov. "Divigatelarni termal yukini kamaytirish: divigatelarni termal yukini kamaytirish." (2023): 92-96.

Web of Technology: Multidimensional Research Journal
webofjournals.com/index.php/4

6. Abdupattayev, S. A., and A. A. Abdubannopov. "Bog ‘ko ‘chatlari ekishni uzluksiz amalga oshiradigan mashina: bog ‘ko ‘chatlari ekishni uzluksiz amalga oshiradigan mashina." (2023): 96-100.
7. Abdubannopov, A. A., and A. A. Ismoilov. "Haydovchining yo ‘l harakati tizimidagi o ‘rni va harakat xavfsizligi darajasiga ta’sirini tahlili: haydovchining yo ‘l harakati tizimidagi o ‘rni va harakat xavfsizligi darajasiga ta’sirini tahlili." (2023): 100-103.
8. Abdubannopov, A. A. "Avtomobillarni yonilg‘i sarfi me’yorini va ekologik ko‘rsatkichlarini ekspluatatsiya sharoitida aniqlash metodikasi: avtomobillarni yonilg‘i sarfi me’yorini va ekologik ko‘rsatkichlarini ekspluatatsiya sharoitida aniqlash metodikasi." (2023): 1027-1030.
9. Davronzoda, X. D., & Abdubannopov, A. (2023). Analysis of the existing aspects of the problem of processing and use of vehicle tyres. American Journal of Technology and Applied Sciences, 19, 149-155.
10. Adxamjon o‘g, X. M. M., & Abdulxaq o‘g‘li, A. A. (2022). Trasport vositalarida yuklanishlar va ularni hisoblash rejimlari. PEDAGOG, 5(5), 258-260.
11. Adxamjon o‘g, X. M. M., & Abdulxaq o‘g‘li, A. A. (2022). Avtomobillarda tashishni tashkil etish, ekspluatatsiya qilish sharoitlari. PEDAGOG, 5(5), 281-284.
12. Adxamjon o‘g, X. M. M., & Abdulxaq o‘g‘li, A. A. (2022). Avtomobillarning texnik ekspluatatsiyasining rivojlanish bosqichlari. PEDAGOG, 5(5), 265-272.
13. Adxamjon o‘g, X. M. M., & Abdulxaq o‘g‘li, A. A. (2022). Avtomobil transporti vositalarining ekspluatatsion xususiyatlari. PEDAGOG, 5(5), 252-257.
14. Adxamjon o‘g, X. M. M., & Abdulxaq o‘g‘li, A. A. (2022). Nometall materillar ishlab chiqarish texnologiyasi. Pedagog, 5(5), 261-264.
15. Adxamjon o‘g, X. M. M., & Abdulxaq o‘g‘li, A. A. (2022). GAZ divigatelining termal yukini kamaytirish. Pedagog, 5(5), 273-280.
16. Abdubannopov, A., Qambarov, U. B., Maxmudov, I., & Xametov, Z. (2022). Haydovchilarni zamonaviy usullarda tayyorlashning harakat xavfsizligini ta’minlashga ta’sirini tadqiq etish. Евразийский журнал академических исследований, 2(6), 847-851.
17. Abdulhak, A. A. (2022). Transportation loads and their calculation modes. Galaxy International Interdisciplinary Research Journal, 10(3), 365-367.
18. Abdulxaq o‘g‘li, A. A. (2022). Yuk avtomobillari ishlatish, ulardan foydalanishni baholash. Лучший инноватор в области науки, 1(1), 596-601.
19. Shuxrat o‘g‘li, A. X., Bahodirjon o‘g‘li, L. A., & Abdulxaq o‘g‘li, A. A. (2022). yuk tashishni tashkil etish va yo ‘llarning ahamiyati. Pedagogs Jurnali, 10(4), 213-219.
20. Xametov, Z., Abdubannopov, A., & Botirov, B. (2021). Yuk avtomobillarini ishlatishda ulardan foydalanish samaradorligini baholash. Scientific progress, 2(2), 262-270.
21. Abdulxaq o’g‘li, A. A. Tashkil etish va mexanizatsiyalash». Редакционная коллегия, 253.
22. Abdulxaq o’g‘li, A. A. Asosiy elementlar». Редакционная коллегия, 266.
23. Abdulxaq o’g‘li, A. A. Foydalanishni baholash». Редакционная коллегия, 287.

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