

which are used only in the absence of experimental data Acceleration time to set speed.

If you are using the model has to consider restrictions on the availability of adhesion to the road, according to which, regardless of engine power and vehicle mass during his acceleration to the desired speed V shall not be less than $V / (35,3\mu)$ Where μ - Coefficient of traction with the road.

Conclusion. Established that dominuyuchymy factors dynamic properties are only two cars - vehicle weight and engine power rating. This rough estimate for the Acceleration of time to any given movement speed is enough to have information only on its mass, nominal motor power and empirical numerical value of one parameter - the coefficient C Determined for several cars to the test vehicle similar in purpose, size and technical level.

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Established something domynyruyuschee Effect on Dynamic Properties Only two cars okazыvayut s konstruktivnyh option - Massa and nomynalnaya-power engine. Polucheny predelno matematycheskye Simple models for pryblyzhennoy otsenki TIME razhona cars to zadannoy velocity motion.

Time razhona, zadannaya velocity motion, nomynalnaya-power engine, Massa car.

Found that the dominant influence on the dynamic properties of the cars have only two of their design parameters - mass and engine power rating. Obtained very simple mathematical model to estimate the approximate time the vehicle accelerates to the desired speed.

Acceleration time given speed, engine power rating, vehicle weight.

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CLARIFICATION OF MECHANICAL MODEL elastic WHEELS

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Elastic wheel can not be regarded as a monolithic hardened body balance equation which make the use of dynamic range. It should be seen as two solids pivotally interconnected - wheel drive and lever angular velocity which is slightly higher than the disc.

Elastic wheel, dynamic range, rolling radius.

Problem. In [1] specified in the error equation using dynamic radius establishes the relationship between attached to an elastic wheel torque and pulling force.

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However, this equation should follow from the condition of balance wheels, compiled on the basis of the scheme forces and moments applied to the wheel submitted in the form of a monolithic hardened body. This means that the mechanical model of elastic wheel as a monolithic body, which interacts with the supporting surface on the shoulder of the dynamic range is incorrect.

The purpose of research. Clarification of the theory of elastic rolling wheels determine the cause of impropriety by its mechanical model, filed a hardened monolithic body, which interacts with the supporting surface on the shoulder of the dynamic range.

Results. Consider the simplest case of motion wheels on solid support surface - Fig. 1.

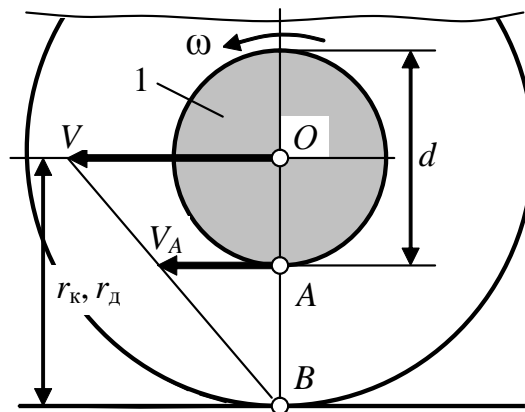


Fig. 1. Diagrams of distribution of linear velocities of points hard wheels in JAR-section.

Suppose that the elastic wheel has a small normal load at which its normal deformation virtually absent and the wheel can be considered quite tough. Suppose also that the drive wheels 1 driven into motion with angular velocity ω , and slipping or sliding wheels relative to the bearing surface is missing. In this case t . In an instant will be a center of rotation

of the wheel in its absolute motion, so that the linear velocity of the points O and A equal to:

- linear velocity t.O:

$$V = \omega \cdot r_k, \quad (1)$$

where r_k - Wheel rolling radius at which, according to Item 27 standard [1] to mean the longitudinal component of translational wheel speed V its angular velocity ω (Or, equivalently, the ratio of the longitudinal component L path traversed wheel angle to its rotation α):

$$r_k = \frac{V}{\omega} \equiv \frac{L}{\alpha}; \quad (2)$$

- linear velocity v. A wheel disk diameter d :

$$V_A = V - \omega \cdot 0,5d = \omega \cdot (r_k - 0,5d). \quad (3)$$

Point B is instantaneous center of rotation of the wheel, so the linear velocity and the velocity vector of length zero.

Straight lines connecting the end points of the velocity vectors E, A and straight lines, we obtain the linear velocity of force distribution points hard wheels in JAR-section. It is the entire length of a straight line, indicating the uniformity of the angular velocity of rotation of the wheel hard in that section.

Consider the second case, the normal load is large, there is a significant normal deformation of the tire, so that should be considered elasticity wheels - Fig. 2.

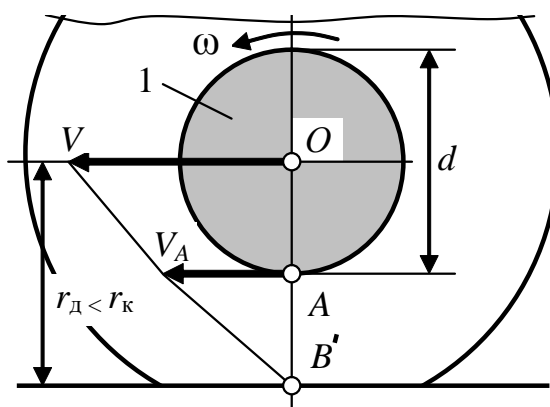


Fig. 2. Diagrams of distribution of linear velocities of points elastic wheel in JAR-section.

In modern radial ply tires are brekernyy (base treadmill) has a high elasticity in the radial direction and greater rigidity in the district, resulting in a treadmill "... behave when rolling wheels like a tractor crawler chain" [3, p. 38].

Under such conditions the way L Passed wheel when you turn it on one turn ($\alpha = 2\pi$), will be the same as in the previous case.

This means that the radius of the wheel bearings (expression (2)) and the linear velocity $t.O$ (expression (1)) in this case, too, are the same as in the previous case, as shown in Fig. 2.

According to expression (3) linear velocity of point A also remain unchanged, which is also shown in Fig. 2.

Connecting the end points of the velocity vectors O, A and B 'straight lines, we obtain the linear velocity of force distribution points elastic wheel in JAR-section. It is a broken line, indicating the existence of two different angular velocities in that section of the wheel. The area OA-section angular velocity remains the same as before, equal ω . But AB area 'section angular velocity ω' slightly higher, because the less than rigid wheels, shoulders AB '(equal $r_{\text{a}} - 0,5d$) It gives a same linear velocity V_A That of the hard tires:

$$V_A = \omega \cdot (r_{\text{a}} - 0,5d) = \omega' \cdot (r_{\text{a}} - 0,5d).$$

It follows that the angular velocity of AB area 'section elastic wheels is:

$$\omega' = \omega \cdot \frac{(r_{\text{a}} - 0,5d)}{(r_{\text{a}} - 0,5d)}. \quad (4)$$

Consequently, the elastic wheel can not be regarded as a monolithic hardened body that interacts with the supporting surface on the shoulder, which is the dynamic range r_{a} .

Applying the principle of curing, flexible wheel should represent as two solids pivotally interconnected - wheel drive 1 of rim diameter d , rotating with angular velocity ω , and attached to the arm length AB 2 '= $r_{\text{a}} - 0,5d$ (Fig. 3), whose angular velocity (ω') Is slightly higher than ω And is defined by the expression (4).

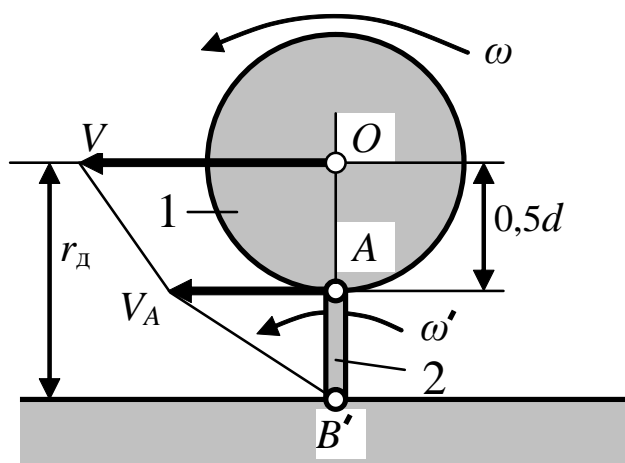


Fig. 3. Submission of an elastic wheel in two solids.

The forces acting in such a mechanical system, can not be determined using the equation of equilibrium.

This can be done by using the virtual work equation that has the form (Fig. 4):

$$\delta A = M_k \cdot \delta\alpha - P_k \cdot \delta L - R_z \cdot a \cdot \delta\alpha = 0, \quad (5)$$

where $\delta\alpha$ - A variation of the angular coordinates α wheels;

δL - Variation of linear coordinates L Associated with variation $\delta\alpha$
ratio $\frac{\delta L}{\delta\alpha} = r_k$ Which follows from the definition of rolling radius.

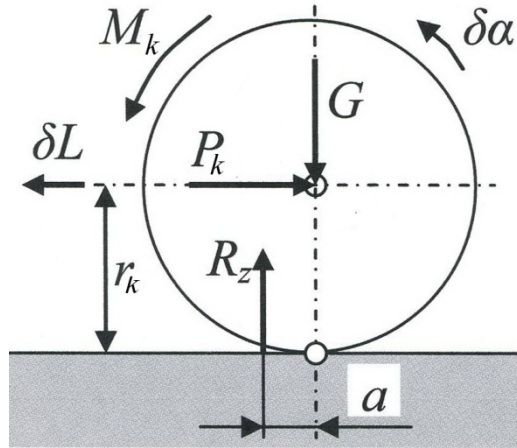


Fig. 4. Construction of virtual work equation wheels.

Equation (5) implies

$$M_k = P_k \cdot \frac{\delta L}{\delta\alpha} + R_z \cdot a = P_k \cdot r_k + R_z \cdot a,$$

confirming the interaction of elastic wheels supporting surface on the shoulder, rolling radius equal r_k Rather than the dynamic range r_d .

So you can use a common model and elastic wheels - in the form of a monolithic solid state, but should take into account only the wheel rolling radius r_k .

As for other aspects of elastic wheels - slipping, rolling resistance force it, these were unaffected except that in all cases shall apply only rolling radius, not dynamic range.

Conclusions

The cause fallacy equation using dynamic range establishes the relationship between attached to an elastic wheel torque and pulling force is misconception that the elastic wheel can be seen as monolithic hardened body that interacts with the supporting surface on the shoulder of the dynamic radius.

Actually flexible wheel should be considered as a mechanical system of two solids pivotally interconnected - wheel disc diameter d and attached to the arm length $r_d = 0,5d$, Angular velocity which is somewhat

larger than the angular velocity of the disk. The use of such a model wheels eliminates the possibility of error.

It is possible model and use the wheel as a monolithic solid state, but it should be taken into account only the rolling radius.

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Эластичное колесо невозможно рассматривать а видео монолитного затвердевшего ПЕ Interaction with кторого опорной поверхностью happening on the shoulder, anyway Dynamic radius. His sleduet рассматривать а видео of two of solid bodies, articulated соедьенных Between you - trailers and рычага drive, Whatnot rotation velocity кторого несколько more, something disc.

Эластичное колесо, Dynamic radius, radius rolling.

The elastic wheel can not be considered as hardened monolithic body equilibrium equations of which are made with the use of loaded radius. It should be presented in form of two solids pivotally interconnected -web of wheel and lever angular, velocity of which is slightly larger than the same of web of wheel.

Elastic wheel, loaded radius, rolling radius.

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ANALYSIS Bandwidth harvesting and transport complex for cereals

SG Fryshev, Dr. NAUfor

The method of analysis bandwidth machine-transport complex for crops and improving its parameters in the application of handling technology.

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Throughput, combine harvesters, trailers, conveyors, vehicles, analysis, methodology, process parameters.