STUDY THE THEORETICAL BASIS OF ANY CHANGES THAT CAN OCCUR IN THE FREE AND FORCED VIBRATION OF AUTOMOTIVE PARTS MATERIALS

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Abstract: *To obtain new materials for the details of cars manufactured and currently being produced in the Republic of Uzbekistan, to conduct tests of free and forced vibrations of car details and to be able to apply them to production and to conduct tests of free and forced vibrations of car details currently produced in our country in laboratory conditions 'to study and compare the results of previous and our laboratory tests.To study the details of the free and forced vibration tests of cars produced in our country in laboratory conditions and to compare the results of the previous and our tests conducted in laboratory conditions.*

Key words: *Vibration, test, detail, laboratory, materials, transport, modeling, method, mechanical engineering, industry, frequency, mechanical energy, torque, force, coefficient, speed, System, amplitude, damped oscillations, phase characteristics , experiment, experimental test, pressure, extinguisher*.

INTRODUCTION

When the car is moving on an uneven road, it is constantly exposed to road waves, which causes the system to vibrate (step, jump, roll, etc.). Thus, the vehicle is subject to forced vibrations. Likewise, every time the engine is turned on, there is a residual balance force that is transmitted to the vehicle chassis through the engine mounts, which again induces forced vibrations in the vehicle chassis[1-2].

A damper dissipates energy instead of storing it. Since damping force is proportional to speed, the greater the movement, the more energy the shock absorber dissipates. Thus, there comes a time when the energy dissipated by the shock absorber is equal to the energy fed by the force. At this point the system has reached its maximum amplitude and will continue to oscillate at this level until the applied force remains the same [3-4]. If there is no damping, there is nothing to lose energy, and so theoretically the motion will continue to increase to infinity [5-6]. When a system is given an initial energy in the form of an initial displacement or initial velocity and then released, it is free to oscillate under the desired conditions. If there is damping in the system, then the vibrations die out. If a system is given continuous energy in the form of a continuously applied force or a continuously applied displacement, then the resulting vibration is called a forced vibration. The energy input can overcome what is lost by the damping mechanisms and the oscillations become stable.

We will consider the free and forced vibration of the car[7-8].

Using Newton's second law of motion, a mathematical model is constructed taking into account the damping force[9-10].

The case where the car is subjected to periodic force is analyzed in detail.

How the amplitude scaling factor changes in this way for a range of damping factors with the ratio of forcing and natural frequencies. can be checked.

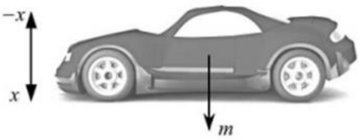
Estimates are required to reach the result, including the use of real data results. Validated using numerical results[11-12].

Differential equations are often used to model vibrations of engineering systems.

The general approach is applicable to free and forced vehicle vibration and various other engineering problems. Recommended stability with good comfort on uneven roads[13-14].

Assume that the car has a mass of 6 m = × 1.2 10 and that it has a shock system.

The damping coefficient is 7 c = ×1 10 . If the free vibration of the car is low and the first is normalized. Crossing the equilibrium state occurs in 0.05 seconds. The stability of the machine is considered satisfactory if the maximum distance m x = d in the steady state is below 0.2 m for all driving speeds[15].



A car of mass m is supported by springs and shock absorbers as shown in the figure.

Shock absorbers resist movement proportional to vertical speed (up-down movement). Free vibrations occur when the machine is running Gets out of balance, for example, after encountering a pit. After any moment to the resistance of the net forces acting on the mass m when it hits the pit the damping force of shock absorbers is affected. These forces tend to return and brings the vehicle to its initial equilibrium position. The vibration process of the car is divided into two parts: under-spring masses (wheels and bridges) and over-spring masses (body, frame and parts of the chassis attached to it). It is known that the under-spring masses of the car moving on uneven roads are affected by relatively larger dynamic loads and they vibrate with larger amplitudes than the over-spring masses. If the unevenness of the road is partially softened by means of elastic tires, body vibrations are reduced by means of elastic parts of the suspension (spring, spring, damper and rubber pad), and then it is extinguished by the shock absorber device, which works due to the viscosity of the liquid. In order to reduce vibration loads on the body of the driver and passengers, the seats are installed on elastic supports or made of soft materials. The driving smoothness of the car is evaluated by the following vibration indicators:

1. Oscillation period T, sec

2. Oscillation frequency, gs;

3. Amplitude of vibrations Zmax, m;

4. Speed of vibrations Z, m/s;

5. Acceleration of vibrations Z, m/s

In addition, the duration of exposure of the source of vibrations and the speed of their extinction are also important. That's why the level of load in vibration is accepted as a generalized indicator of walking smoothness. For example: the vibration frequency, which is not harmful to the human body, is 1...1.5 Hz, that is, this amount means 60...90 steps/minute. If the frequency of vibrations is greater than this indicator, the human body is affected by the load during running and quickly gets tired. Experiments show that when driving on flat roads, passenger cars have a frequency of 1.25...1.42 Hz, trucks have a frequency of 1.6...2.2 Hz, if they are heavy When driving in road conditions, this quantity is 6...8 Hz. can reach up to Vibration parameters of cars with a high level of driving smoothness should meet the following requirements: 1) Z = 0.05m vibration amplitude T =1.33.Gs;

2) Z = 0.008...0.02m and T = 2.Gs.

An increase in the acceleration of vibrations is also quickly accepted by the human body. If this amount exceeds s Z =2.5 m/s .. , the body will get tired after a few minutes, if   2Fts. at , s Z = 4.5m/ s and T =1.25...1.33.Gs. If Z = 5.5m/s .. is the amount, it will have very harmful consequences.

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