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APPRECIATING THE TRACTOR COMFORTABLENESS THROUGH THE COMFORT PARAMETER

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EXTENDED ABSTRACT

1. Introduction

During the tractor moving along roads with dislevelments, there appear oscillating movements of the seat and of the body of the tractor. These vibrations have harmful effects upon the works carried out by the tractor, as well as upon the parameters that characterize the comfort of the seat. The tractors, in principle, do not have a so-called suspension of the axles, and the elastic suspension offered by the tyres with air tubes is not sufficient for the tractor driver's efficient protection.

The comfortableness of the tractor consists in its performance characterized through its capacity to circulate for a long time with the exploitation speed without the tractor driver's unpleasant sensations or rapid fatigue, and with the works carried out by the tractor-aggregate of a high quality.

2. Definition of the comfort parameter

During the appreciation of the comfort there will be usually used as parameter, the acceleration of the vertical oscillations. In the paper there will be considered as comfort parameter, noted with λ, the ratio between the maximal acceleration of the seat and the height of the road dislevelments the tractor circulates upon.

Considering the dynamic model with two degrees of liberty, and the dislevelments of a sinusoidal type, there ensues:

$$(1)\quad \lambda = \frac{\omega^2\sqrt{(k_1k_2 - c_1c_2\omega^2)^2 + (k_1c_2 + k_2c_1)^2\omega^2}}{\sqrt{[(k_2 - m\omega^2)(k_1 - M\omega^2) - \omega^2(c_1c_2 + mk_2)]^2 + [c_2\omega(k_1 - M\omega^2) + c_1\omega(k_2 - m\omega^2) - mc_2\omega^2]^2}}$$

where

$$(2)\quad \omega = \frac{2\pi v}{l}$$, with v – speed of the tractor and l – length of the dislevelments

The human being's sensitivity to the vibrations depends not only on the acceleration of the seat, but also on their frequency. This is why the acceleration has to be analyzed according to the frequency and the buffering coefficient of the suspension.

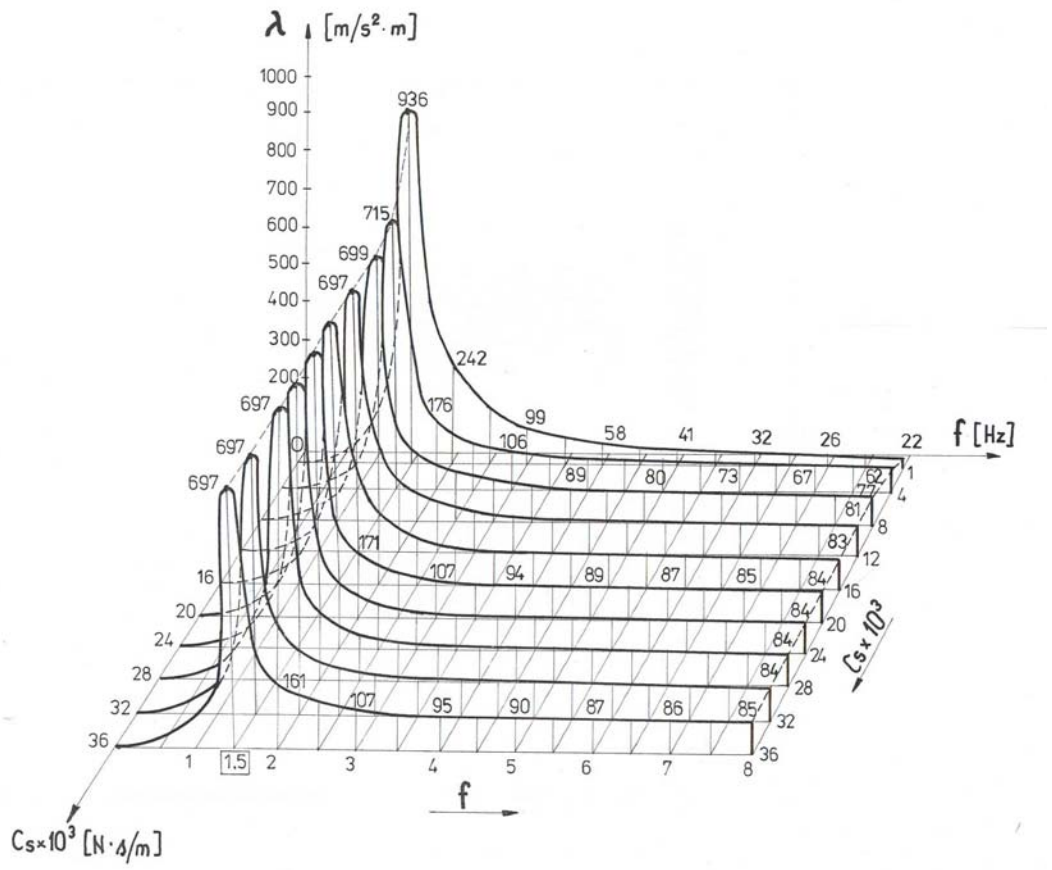

Fig. 1. Diagram buffering coefficient – frequency – comfort parameter

At the perturbing frequency of 1.5 Hz there will be obtained strong peaks of the comfort parameter. In this area there is also the frequency of resonance of the seat.

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