

**PASSIVE PRINCIPLE OF PROTECTION AGAINST
LOW-FREQUENCY VIBRATIONS OF TRACTOR MASSES
DURING TRANSPORTATION OF LIQUID TANKS**

Kozhushko A.

National Technical University

«Kharkiv Polytechnic Institute», Kharkiv

Today, when performing transport works, the machine-tractor unit is primarily engaged in cargo transportation, assembly and distribution works. The cargo transported is divided into solid and liquid. Since the transportation of liquid cargo leads to additional free oscillations that affect the movement of the tank and wheeled tractor as a whole, the development of this area of research is relevant. Moreover, not only for agriculture, but also for other industries and transport. After all, this will significantly increase the technical and operational performance of the machine-tractor unit.

During the movement of the tank with liquid as part of the machine-tractor unit, various mechanical and hydromechanical oscillations are excited in the elements of its construction, which form a wide range of frequencies. It is known that the well-being and health of a person are most negatively affected by oscillations with a frequency of 0.5... 2 Hz, which have a vertical direction (along the torso of the driver). Forced oscillations of the specified frequency can be excited from roughnesses of the road, however their amplitude is leveled by action of springs and shock-absorbers of a cabin and seat and remains insignificant. Another situation arises when forced oscillations occur at the resonant frequency of free oscillations of the machine-tractor unit.

In liquid tanks, which are part of the machine-tractor unit, there are free oscillations of the liquid with frequencies less than 2 Hz. However, these studies do not answer the question of whether the oscillations of the liquid in the tank through the traction coupling device to the tractor driver's cab and his seat. And whether the corresponding associated oscillations in the tractor cab will have a harmful vertical projection.

In addition, it should be added that in the machine-tractor unit may exist in a dangerous frequency range and other free oscillations that are not caused by fluid overflow. However, since the frequencies of surface waves depend on the liquid level, and this level can be arbitrary when performing agricultural transport works, taking into account these waves creates special difficulties and, at the same time, is of great interest.

Dynamic analysis should take place under the condition of rectilinear movement of the vehicle, due to this oscillations are formed, which act in the longitudinal-vertical and transverse-vertical planes.

Before creating a complex mathematical model taking into account most of the factors that affect the dynamic component of the vehicle with liquid transport units, it is necessary to develop a linear (linearized) model that will take into account all known relationships between elements and be formed and analyzed using matrix analysis.