FEATURES OF THE APPLICATION OF THE ENERGY RECOVERY SYSTEM OF SUSPENSION DAMPING DEVICES ON ARMORED COMBAT VEHICLES

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Over the past decades, much attention has been paid to the development and research of various energy recovery systems (ERS) of suspension damping devices (SDD) of vehicles to increase their efficiency and environmental friendliness. Many designs of electric, hydraulic, pneumatic, and inertial-mechanical ERS are being studied and intended for use on various types of vehicles. Nevertheless, their implementation on serial vehicles is progressing very slowly. Among the unresolved problems are both purely technical and the lack of a sufficient volume of theoretical and experimental research on the dynamics of the joint operation of mechanical and electromagnetic systems, the assessment of their interaction, taking into account all the features of operating conditions, depending on the purpose of the vehicle.

The analysis of the features of the application of the ERS SDD suspension on armoured fighting vehicle (AFV), which must be taken into account when developing them, showed the following:

1. The ERS SDD suspension of the AFV has many times higher efficiency compared to civilian vehicles, which is a consequence of their operation in challenging road conditions with increased speeds when energy losses in the SDD suspension of the AFV can reach 30% of the power plant.

2. An urgent problem in ensuring high tactical and technical characteristics of the AFV is the need to increase the energy consumption of the SDD while simultaneously reducing their thermal stress, which is logically solved when using the ERS SDD.

3. The introduction of the ERS SDD on the AFV will allow the improvement of both mobility indicators (smoothness of movement, average speed, range, etc.) and indirect indicators of firepower and protection.

4. When using systems for controlling the characteristics of suspension units, which is a pressing problem of modern AFVs, it is necessary to provide for their combination and functioning together with the ERS SDD suspension.

5. The use of the ERS SDD can be especially effective in the presence of a hybrid power plant (HPP), which is considered appropriate only for wheeled AFVs weighing up to 30 tons. In this case, it is necessary to use electric-type energy storage devices. In the case of tracked vehicles weighing 40…50 tons, without HPP, to increase the efficiency of the ERS. When choosing an energy storage device, it is necessary to ensure its minimal conversion from one type to another.

6. The operation of the AFV takes place in more severe climatic and road conditions, which can significantly affect the choice of the type of energy storage device.

Considering these features will allow for determining the rational structure and type of the ERS SDD suspension when applying it to an AFVs.