ENSURING THE EFFICIENCY OF THE HYBRID POWER PLANT BY THERMAL STABILISATION OF THE BATTERY

Meshkov D.V., Goriachyi Ya.V.
National technical university
«Kharkiv Polytechnic Institute», Kharkiv

The active development and widespread use of hybrid and electric vehicles contributed to further research in the field of improving the efficiency of using such power plants. One of the most urgent tasks today is to speed up the process of charging the built-in rechargeable batteries and increase the mileage on one full charge.

By analysing the available information and specialized literature it has been found that in order to achieve the maximum efficiency of such a power plant, it is necessary to maintain the optimum temperature of the electric motor, power electronics and battery. Several basic methods of thermal stabilization are known [1–3]. However, it should be noted that almost all the above methods use the energy of the battery for cooling, which leads to a decrease in the efficiency of the power plant.

This article describes the innovative method of thermal stabilization of the battery by using an immersion liquid as a refrigerant. Technologies that have become widespread in computer equipment for cooling high-temperature processors are now increasingly being used in the electrical and electronic components of modern electric vehicles. The core of the technology is the application of a special dielectric cooling gel to the active surfaces of the battery, which is able to effectively maintain the temperature regime of the battery having an electronic control system.

The purpose of this article is to make an integrated assessment of the developed technology efficiency, to study the effect of the immersion system of thermal stabilization of the battery on the efficiency of the power plant and to develop the algorithms for the electronic cooling control system.

The issue related to the development of an algorithm for controlling the thermal stabilization system is of particular interest. As shown in [2], the introduction of an active temperature control system into the power plant structure can increase the vehicle mileage by 30%, and the battery charge rate increases by 25–40% when using a high-power charging station. At the same time, it is noted that the use of the stabilization system has a positive effect on the battery life and it is possible to exclude or reduce the number of battery charges from high-power stations. Some manufacturers have introduced a limit on the number of such high-power charges.

References:

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