TO THE SELECTION OF THE CALCULATION PARAMETERS OF HIGH-HEAD REVERSIBLE HYDRAULIC MACHINES

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Reliable power supply to industry, transport, agriculture and household needs of the population is the important challenge facing modern electric power industry. The most significant parts in the structure of energy systems are thermal and nuclear power plants with superpower units. Moreover, there are changes in the powers structure now. These changes are directed towards increasing the power of renewable energy sources. This trend requires ensuring the maneuverability of the power system due to the electricity consumption curve irregularity. The functional features of hydropower equipment of Hydropower Stations and Pumped Storage Power Stations allow the energy system to carry peaks, valleys and other daily load fluctuations with the most economical parameters.

The development of hydraulic equipment for high-head PSPSs, within the order of 500 m, is an important challenge that is set in accordance with the *“Energy Strategy of Ukraine for the period up to 2035”*. It provides for the construction of the Zakarpatskaya PSPS for necessary head with a maximum power of hydraulic unit of 230 MW in the pump mode.

During designing new PSPSs, if there is no the definite unit in the product range, it is necessary to choose the calculation parameters for the new reversible hydraulic machines. иTaking into account that the pump mode is determinative for a reversible hydraulic machine, the speed coefficient is determined by the following formula adopted in the practice of pump engineering:

$$n_{ns} = \frac{3.65 \cdot n \cdot \sqrt{Q_p}}{H_p}.$$

For these parameters, n_{ns} should be in the range 100-110.

The second important parameter is the suction headH_s, which is also determined by the pump mode and, in a first approximation, for high-head hydraulic machines is found by the equation:

$$H_s = \frac{n_{ns}^{4/3}}{4080} \cdot H_p - 10.$$

For these values, H_s equals 45-50 m.

Changingtherangeofpossibleoperationofareversiblehydrounitisachievedby means of asynchronized generators, which allows it to operate in the characteristic optimum in both modes (turbine and pump).