

COMPARATIVE ANALYSIS OF TECHNICAL AND ECONOMIC INDICATORS OF SYNCHRONOUS AND ASYNCHRONIZED HYDROGENERATORS

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The relevance of the topic is due to the possibility of asynchronous machines:

- Ensuring a stable value and frequency of the generated voltage with an unstable source of mechanical energy.
- Energy saving from normalizing the frequency: lowering the frequency leads to an increase in current during energy transfer and, consequently, to an increase in losses.
- Energy saving from the ability to regulate voltage.
- Energy savings from the ability to manage energy quality.
- In some cases, in order to increase stability and export energy to other countries, it turns out to be advantageous to combine energy systems not rigidly, as is done now, but “flexibly” - through controlled connections consisting of engine-generator complexes with asynchronous machines.

ASG differs from synchronous machines in that the magnetic field moves relative to the rotor that creates it; ASG differs from asynchronous machines in that this movement is created by an external source and is controllable .

Intended Novelty:

- for the first time creating a model of an asynchronous synchronous generator from library elements of the Simulink program. This makes it possible to independently evaluate the adequacy of theoretical models;
- for the first time, analysis of energy flows in the LHG with deep ($\pm 60\%$) regulation of the excitation frequency. This makes it possible to conclude the feasibility of applying self-excitation for ASG;
- for the first time establishing the dependence of the efficiency on the excitation frequency with its deep regulation. This makes it possible to determine the appropriate areas of application of asynchronous synchronous generators.

Expected Result:

- increasing the stability of the energy system due to the possibility of regulating the flow of reactive energy between the asynchronous generator and the network;
- increasing the stability of the frequency and voltage of a wind turbine with an asynchronous generator due to the possibility of maintaining a constant frequency and voltage with a changing wind speed;
- providing the possibility of decoupling the frequency of electrical systems through independent regulation of the output frequency of the generator.
- Advantages of ASG allow using them as autonomous generators, for example, in wind energy.