ALTERNATIVE SOURCES OF ELECTRIC ENERGY: WIND GENERATOR

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Nowadays more and more attention is paid to conservation of natural resources and environmental protection. Humanity needs alternative sources of energy that are both environmentally friendly and cheap.

The objective of the study is to compare the existing modified models of the wind generator.

The following tasks were set:

1. To investigate the basic methods of generating electrical energy.

2. To study the operating principles of the wind generator.

3. To consider the widely known models of wind generators.

4. To compare the widely known models with wind generators.

Thus, if we can create affordable, cheap, environmentally friendly energy storage, we will obtain cost-effective wind generators.

Nowadays there are several alternative methods of generating electricity, but all of them are far from being perfect. The wind generator has many advantages, although fuel generators are still most common. They have increased wear and high fuel consumption, they also produce harmful emissions and their production is expensive. It's known that non-renewable reserves of energy sources (oil, gas) are exhausted. Although coal reserves will be sufficient for some more time, the power plants working on coal are environmentally unfriendly. They emit CO2, CO and carbon dust into the atmosphere. It's obvious that new sources of energy are required. Wind power plant converts the kinetic energy of wind into mechanical and electrical energy. This plant is convenient for practical use.

Having made several attempts to create the wind generator and studied theoretical background of the new sources of energy, we have come to the conclusion that the obtained energy could be used in practice, but it requires a relatively large size of the valve. Taking into account all these facts and also the complexity of mechanical structures, some processes had to be simulated. Similar calculations can be made for the entire structure. If $\beta = 1$ kg / m, $r = 2$m, $\upsilon = 5$ m / s, $N = 750$ watts. And if the speed of wind increases up to 10 m / s, the output power will be 6280 W, which is acceptable for practical application.

If a big wind generator with r = 5 m is installed in windy weather, the plant capacity increases to 50,000 watts, while in calm weather it reaches 2.5 kW.

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PROBLEMS OF EXPLORATION OF STEAM GENERATORS IN NUCLEAR POWER PLANT

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One of the important elements of NPP (Nuclear Power Plant) with reactors with pressurized water of VVER and PWR type is a steam generator (SG), which generates steam for the turbine generator and production of electricity.

Currently in NPP with VVER, SG like PGW-440 and PGW-1000 are used. Their construction, in comparison with the project design has undergone changes and modifications during the operation. The process of improving SG, which are in operation, continues. This is due to the need to extend the life of existing plants (steam generators of PGW-440 type at a number of nuclear power plants are currently in operation beyond the project life of 30 years). At the same time, ways to increase the power (efficiency) as well to reduce the size of SG for easy transportation and installation are constantly studied.

The purpose of this work is to identify and consider the problems arising during the operation of steam generators.

The objective of this research work is to consider the issues related to:

- extending the life of existing and planned facilities;
- increasing the power of a steam unit;
- reducing the size of the steam generators and as a consequence the simplification of transportation;
- increasing in the level of water chemical regime;
- the problem of corrosion.

It should be noted that starting from the first projects of steam generators, increasing of their power was held with the help of reducing the size of pipes (21x1,5 in the first projects and 16x1,5 in PGW-1000M) and increasing in their number (from 2074 to 10978 tubes) .To reduce the size of SG, it is required to put as much as possible of heat exchanger tubes in the unit.

In the work, two options of heat exchanger bundle for reducing the size of the steam generator are offered:

- with pipes 16x1,5 mm and steps 24x20 mm;
- with pipes 15x1,4 mm and steps 24x20 mm.

Design of SG in NPP with VVER has great potential in terms of improving the reliability service life and reducing maintenance costs. In view of the increasing demands of the water chemical regime and conducting necessary research and development work, the goal for new SG projects with life of 50-60 years was set. Key design decisions of horizontal SG can be used for new power capacity to 1600 MW, which are competitive in the global energy market.

The main direction of work on improving the reliability and performance of the SG in operation and units under development is to provide water chemical regime requirements at the level no worse than achieved at the world level. Also, promising is the direction the main objective of which is the optimum change in size and number of heat exchanger tubes, which will reduce the size of steam unit and improve its operating parameters. Besides, the choice of construction materials, with the highest corrosion resistance, plays an important role in the reliable operation of the steam generator.

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FORMATION OF HIGH POWER MICROWAVE PULSES WITH ADJUSTABLE PARAMETERS IN RF COMPRESSION SYSTEMS

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Presented the results of theoretical and experimental studies of the formation of microwave pulses with the adjustable power, duration, repetition rate and the envelope form during energy output from the cavity by controlled transformation of the oscillation mode at the waveguide stub coupling aperture [1]. Pulse parameters are changed by adjustable elements of the coupling of modes, which directly affect to the coefficient of the coupling of modes *h*. In this work the possibility to form a series of subnanosecond duration MW pulses at a fractional energy output and nanosecond pulses of various lengths at a single complete output of high frequency energy from the compressor cavity are demonstrated. The shape of the pulses is calculated through the recurrence relations between the amplitudes of waves in the system, the relations between which have been recorded according to the scattering matrix method.

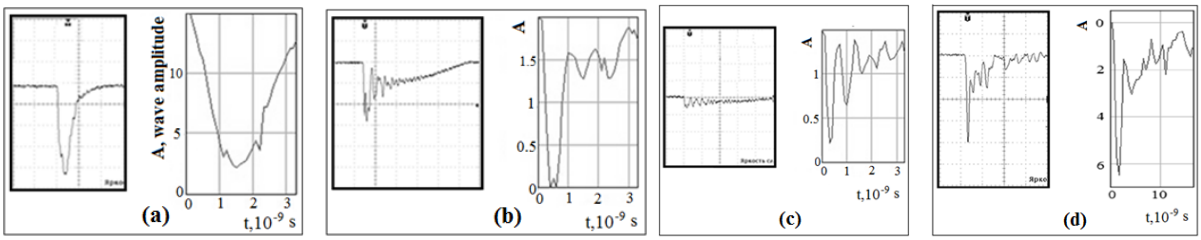

Figure 1. Comparative analysis of the calculated and experimental output pulse envelopes at $h = 0.9$ and a different electrical length of the stub φ: a) $\varphi = 0$; b) $\varphi = 1$; c) $\varphi = 2$; d) subnanosecond length pulse, $h = 0.9$, $\varphi = 0$. Time scanning in the oscillograms is 10ns per division.

Figures 1a-1d show comparative analyses of the calculated and experimental output pulse envelopes generated in the compressor with the coefficient of the coupling of modes $h = 0.9$ and the electrical length of the stub φ variable within the range 0 .. π. Fig. 1d shows the possibility of formation of subnanosecond duration MW pulses by applying the studied method. Using the coupling element stack, we therefore can generate a series of pulses with a high repetition rate in the range of the excitation pulse. Pulses with a duration of 8-10 nanoseconds, working frequency 9.248 GHz, were obtained by experiment in the X-band MW pulse compressor. The gain of this compressor is 8-9 dB.

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