УДК 811.111:621.315

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**Methods of Electric Power Transmission and Optimization**

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Nowadays, electrical appliances are widely used and many types if equipment working on it. The main problems of our time in this regard are the following: energy transfer, reduction of losses and optimization of the operation of devices. In this work (in this article) we will try to reveal the methods that are being used now and innovative developments that will change the idea of technology and make our life much more convenient and safer.

At the moment there are two main methods of electrical transmission. They are air and cable. Air transmission means the transmission of energy though wires suspended on supports while cable transmission is carried out through cable lines laid underground or in special engineering systems. Based on the purpose of the power line (transmission line) is classified depending on the voltage used. Thus, there are the following voltage levels used in power lines in Belarus: low-voltage (no more than 1 kV), medium-voltage (1-35 kV), high–voltage (110.0-220.0 kV), ultra-high-voltage (330.0-750.0 kV), ultra-high-voltage (more than 750 kV) [1].

When transmitting energy, a large voltage is used which reduces energy losses after which the energy is converted lowering the voltage and distributed among consumers. In addition, costs can be reduced by lowering the resistance or lowering the current. The second method is most favorable, since the first method increases the cost of cable production by increasing their cross-section. To point out the ways to

optimize electricity it is advisable to consider the purpose of power transmission lines. Thus, power transmission lines are classified as follows, depending on the purpose: for ultra-long distances, main purpose, distribution, and consumer. Ultra-long distances power transmission lines are used to connect individual power systems. They are estimated at more than 500 kV. Main purpose power transmission lines provide assistance in energy transmission and are combined into single system. They equal about 220-330 kV. Distribution power transmission lines supply enterprises and large sites. They are estimated at approximately 35-110 kV. Consumer power transmission lines are used to direct energy to consumers. They equal up to 20 kV [2]. When we deal with the transmission of electricity, two ways of transmitting energy are used. They are alternating and direct current. The first way has become more widely used, since the stations are equipped with alternating current generators and when transmitting current in this way, a special three-phase current technique is used for long-distance transmission. But when transmitting over long distances, the second way is more effective, and it has many advantages: the absence of the influence of the length on the power, which increases the distance of the lines; static stability is not taken into account; simplification of the design due to the two-wire and single-wire system, thereby reducing costs; there is no need to synchronize the frequency of the connected power systems; reactive power is practically absent and the influence of electromagnetic waves on the means of communication is reduced. It should be mention that static stability is the ability of a power system to return to a steady state after small disturbances in the regime, in which the changes in parameters are very small compared to their average values. As for reactive power it is power that was not transferred to the load, but led to heat and radiation losses, is called reactive power [3].

This method has not been widely used due to the high cost of equipment and implementation of the method. There is also a wide-spread method of superconductivity based on lowering the temperature to ultra-low, which allows you to transfer energy most efficiently, with the least loss. It was not widely used, as well as by the direct current method due to the high cost, complexity of implementation and lack of technologies that allow implementing this method. Thus, we have considered the transmission of electricity by direct transmission and now we will deal with the conversion of electricity into another type of energy.

Let's start with the method of optical radiation, in which energy is transferred using visible light, infrared radiation, ultraviolet radiation. This method allows you to transfer energy, lasers and solar cells. An example of use can be optical fiber. Another method is magnetic fields. When using inductive coupling energy will be transferred by magnetic fields and to implement this method, we need turns of wire (coils) which allows us to transfer energy over short distances and overcome obstacles. This method is implemented in wireless charging. One more method is permanent magnets. Magneto dynamic coupling that is realized by means of magnetic fields and is transmitted by rotation of permanent magnets. An example of the implementation of this method can serve as the development of floating lamps.

Another method is resonant inductive coupling. It is the wireless transmission of near-field power between magnetically coupled coils, which is part of a resonant circuit tuned to resonate at the same frequency as the drive frequency operates at a certain frequency and transmits energy due to magnetic fields and is transmitted due to oscillatory circuits.

Microwave radiation is another method that presents electromagnetic radiation, including the decimeter, centimeter and millimeter ranges of radio waves, microwave frequencies

are exceeded from 300 MHz to 300 GHz. It is transmitted by means of microwave waves due to phased rows of parabolic antennas. The capacitive coupling, in turn, based on an electric field, is transmitted by means of electric plates [4].

In conclusion, at the moment there are many ways to transmit electricity, all of them are improving and becoming more efficient and cheaper but the full potential of each of the methods has not been established so far. With the invention of new technologies, the transmission of electricity without loss over long distances seems more and more possible every day.

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