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Control System of Transmission Process of Alternative Energy to Electrical Energy

Almaz Mehdiyeva*

Control and System Engineering department, Azerbaijan State Oil and Industry University, Baku, Azerbaijan

Abstract

The development of science and technology in our contemporary world depends on the consumption of electricity. According to experts, the demand for electricity will be twice as high as in 2025. This increase in electricity consumption can result in depletion of natural fuel sources and shortage of electricity in the near future. In addition, the environment is seriously damaged when burning hydrocarbon fuels (coal, gas, oil) used in thermal power plants. Taking into account these effects, it is more appropriate to use alternative energy sources for the production of electricity. The research is dedicated to transforming solar energy into electrical energy, one of today's modern requirements. Also prospects for solar energy production in Azerbaijan were considered. In this study, the characteristics of solar power plants are studied. To do this, the solar cells and their structure, their saturation, solar cells have been analyzed. When solar energy has been converted into electrical energy, special modules have been used to control its energy. The types of controls used are investigated. There is a need to manage the process of charging electrical energy to accumulator batteries during the work. For this purpose the structural scheme of the device was created, the controlalgorithm was developed. The proper selection of the elements required for the installation of the gateway control system has been considered, the device's basic scheme has been developed.

Keywords

Alternative Energy, Energy Sources, Solar Energy, Electrical Energy, Accumulator Batteries, Control System, Renewable Energy Sources, Imaging Modelling

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1. Introduction

The rapid development of technology and industry, the increasing number of people on the ground, and the rapid increase in the number of energy consumers further increase the need for inorganic and organic fuels. Fuel supply depletion, constant price fluctuations, damage to the environment as a result of burning of resources and violation of ecology have revealed the need for alternative sources of energy. Alternative energy sources are sources that can provide people with endless energy.

Renewable Energy Sources - Energy sources that are based on the use of periodic energy flows. These energy sources are as follows: Solar Energy; Wind energy; Geothermal energy; Horsepower, withdrawal and energy of the ocean waves; Biomass energy.

Renewable energy sources are divided into two parts:

1) Traditional energy (geothermal energy and biomass energy);

2) Unconventional energy (solar, wind, winding and discharge, energy of sea waves).

According to the current level of technology, the economical use of alternative renewable energy sources is a bit higher than the economic performance of traditional energy sources. Denmark occupies the first place in alternative energy production among European countries. 12.3% of the energy produced in Denmark is made up of

* Corresponding author
E-mail address: almazmehdiyeva@yahoo.com

alternative energy.

In today's world, the elimination of environmental problems in many countries is largely solved by the use of renewable energy sources. Solar and wind energy from alternative sources of energy is widely used. This, in turn, has an impact on the development of energy, economy and other fields [1].

Transforming solar energy directly into thermal energy has taken on a broad scale in the world and is considered as one of the key areas of energy in developed countries. The thermal power of solar energy is quite high. Thus, this figure is 600 MW in the US, 100 MW in France, 100 MW in Israel, 50 MW in Turkey and so on. Level. The useful working ratio of solar cells is 12-14%. The premises built on such photocopies are 2 hectares per 1 MWt. The most cost-effective way to use solar energy is getting warm water and heating up buildings. This method is more commonly used in countries around the world. The amount of solar energy per square meter per year varies by country: 1500-2000 kWh in the United States, 800-1600 kWh / h in Russia, 1200-1400 kWh per hour / sq.m in France, And in China, varies from 1800-2000 kW / hr. As for the amount of sunny hours, this figure is 2500-3000 hours in the United States and Central Asia and 1500-2000 hours in Russia. Photovoltaic elements play a major role in transforming solar energy into direct electricity. Through these elements, solar energy is converted into direct electricity without turning into another energy. Looking at the 2005 results, we can see that through photovoltaic elements only 4 TVs of electricity were produced in the world.

Solar energy is also widely used in our country as an alternative source of renewable energy. As a result of research, our country has a great potential to benefit from alternative energy sources: the average annual solar energy of 1900-2000 kWt per sq. M. Per square meter of our country. When the amount of sun rays falling into the territory of Azerbaijan is compared to other countries, it appears that Azerbaijan is dominant. It is therefore apparent that large-scale investment in the use of solar energy is beneficial in our country. Annual special electroenergy production of photovoltaic plant in Nakhchivan AR is 246kWt / sq.m., and Kur-Absheron region is 230kWt / sq. M. The amount of sunny hours per year is 3200 hours for Nakhchivan Autonomous Republic and 2,500 hours for Kur-Absheron [2 - 3].

2. Statement of the Problem

The structural scheme of the alternative energy transducer has been developed during the research. The structure scheme includes several blocks. The device is designed for both large and small energy. To calculate the maximum power from the sun, we need voltage and voltage ratings from the panel, which are obtained by current and voltage transmitters. The data received from these transmitters are transmitted to the controller and the algorithm we are working on calculates the power of the power and controls the pulsing modulation of the width and correctly regulates the accumulator battery charging process through a fixed current converter. To do this, the input and output values of inputs are required. Characteristics of these battery batches have been considered for proper battery charging. They have their own carbohydrates according to the area in which they are used. In accordance with these characteristics, we have the ability to record the results of any of the collecting tools in the controls, that is, the controls we offer. These characteristics are already known, and the characteristics of the panel voltage and current transmitters are compared with the data of the transmitters after the control is recorded in the control memory. According to him, the controller controls the width of the impulse width, creating the width of the impulse modulation on the output. Frequency does not change during modulation. The width of the impulse is controlled by constant current sources. Its battery is properly filled. In accordance with the algorithm we have established, the performance of the battery will be changed through a special program after the results have been matched to the maximum battery charging characteristic.

The dialer has many used topologies. They are divided into isolated and uninterrupted topologies. Isolated topologies are used in low-frequency high-frequency electrical isolated transformers. They have several possibilities: to increase the output voltage by increasing the capacitance of the input current and output and the transformer proportions. They are used more in converter-powered power supplies. The following basic topologies are:

1. Feedback;

2. Half bridge;

3. Full bridge.

Unsurposed topologies do not have isolated transformers. They are almost always used in stationary current motors. These topologies are divided into three types:

1. Low convergence (decrease);

2. Upper convergence (increase);

3. Lower and upward rising (decrease and increase).

Reduced topography is used to reduce tension. In photovoltaic applications, the converter is usually used to fill the batteries. It is used to increase tension from topology topology. An incremental converter is used to obtain high output voltage before the transformation phase [4 - 6].

3. The Solution of the Problem

Controllers with control devices are a device that controls the accumulation of accumulators by electric current from the daytime panels in the fields of solar energy conversion. Controllers are used in places that are suitable for a certain fixed tension [7 - 12]. Examples include any electrical equipment, accumulator circuits, and other equipment that operates with constant voltage. The controls the electrical flow and tension from the panel. Protects the battery from overloading and discharging. The battery will transmit a part of the energy it receives until the battery is fully charged, and the battery will be disconnected after the battery is full. Thus, the controls make the battery more durable. Controls are selected from the solar panel and the power of all solar panels based on the total cost. In modern times, the need for controllers is so great that the 12V solar panel output is about 16-20 V tension and we have to adjust this voltage to fill the battery. The voltage required for many batteries to be fully charged is 14-14.5 V. It is not necessary to use the controller in solar panels with output power of 1-5 W.

Controllers have MPPT (Maximum Power Point Tracking) and PWM (Pulse Width Modulation) types for charging batteries.

MPPT - Controls the system by finding the peak point of power as seen on its name. The use of high energy from the systems has been achieved through this. As we know, solar energy is distributed at different prices at different times of the day. And so the energy of the solar panel can be variable. We can not change the variable power to the handler because it can cause the operator to fail or stop working. At this time we use MPPT. Marks the maximum price for power over different time intervals. It performs through complex algorithms.

PWM is used to achieve an average result using analogous digital signals. The wavelengths 1-0 are regulated and the power given to the system is regulated.

The signal received from the PWM has two parameters: 1) Impulse density, 2) Frequency.

The duty cycle is the ratio of the signal to the constant T time of 1 (active). It can be expressed as a percentage and takes a price of 0 ÷ 1. The average value of a PWM signal is straightforward with the duty cycle.

The speed must be chosen so that the built-in transformer, the frequency of the current motor should not be included in the 20hs-20khs frequency band, where the human ear can hear. Otherwise, sounds that cause people's anxiety.

Finally, let's note that PWM allows us to manage power, used in communication systems, power supplies, power transmissions, signal amplifiers, and so on.

When microcontroller software runs, ARC ports of microcontroller divide analog inputs into 1024 quantities and shows different tensions on the 16x2 LCD screen. Thus, the panel and battery voltage measurements are achieved. The foggy resistor is used to find the current value of the photovoltaic module. This resistor joins the ARC consistently. The tension from the suspended resistor corresponds to the current. For example, if the voltage is 5mV when the current is equal to 1A, the tension will be 10 times more than 10 times the current. This output voltage is coupled to the other ARC port, AN2 by means of the amplifier, and the input for the operation of this algorithm.

The impulse width modulation ports are activated when charging the battery. The battery is charged at a voltage greater than 15V and a battery of at least 20V or equivalent. Passes through the panel voltage and current converter. This converter is activated via the bipolar transistor.

The voltage from the accumulator battery to the load and the flow of the transmitter through the transistor activated by the transmitter connected to the pulse width modulation of the current occurs. When the system is installed, the full resistance of the battery and the panel should be calculated according to one another. From the panel and accumulator prices, the intensity point of the power dependence graph indicates the maximum power point.

In Figure 1 shows the outcome of the controlsystem imaging model. When connecting the circuit, voltage inputs and inputs from current transmitters are regulated by comparing the output voltage and voltage ratings to the battery charger. The device compares the automatic input output parameters according to the algorithm and provides the proper operation of the fill process by selecting the correct modulation method. It is clear from the Figure that the first step is the completion of the filling process based on the result of the input and output comparison. There is a proper adjustment of fittings for inlet and outlet. The beatings indicate that the width modulation width modulation method compares the data received from the transmitters at the input and output to the PLC. The width of the impulse is adjusted to find the correct operating mode. It also shows itself in dots on the graph. As seen from the graphic, the device regulates within 4ms.

The PLC ensures an increase in the width by decreasing the frequency by decreasing the frequency, which in turn creates the transistor. These strikes stabilize the output tension. At the first moment of the connection, the tension reaches peak point. This is explained by the fact that there is a breakthrough in which inductive tension is great. The frequency of the device is 25kHs without changing. As a result of the research it was found out that the proper completion of the filling process begins after 6 msec.

Figure 1. Consequences of imaging modeling of the control system.

4. Conclusion

In the study, the process of filling of the accumulator fixed current source by solar energy was investigated and imitation model of the controlsystem was proposed. The characteristics of the solar modules were studied for the construction of this controlcomplex, and the volt-amperage characteristics were analyzed. In studying the characteristics of solar photovoltaic, the importance of creating a regulatory complex was substantiated, and an arrangement device was proposed for correct charging of battery batteries. A system imitation model has been created in MATLAB software environment. In the "device" presented the method of finding the maximum point, which is the most ingenious method. Compared with other devices, our "device" is up to 1-1.5%. This difference was achieved through the proper charging of the accumulator battery through a special algorithm.

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