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Research Article

EXPERIMENTAL STUDY OF OPERATING MODES OF AN UNINTERRUPTIBLE POWER SUPPLY SOURCE USING A WIND GENERATOR AS THE PRIMARY SOURCE

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ABSTRACT

The energy that serves humanity without harming the environment is ecologically clean natural energy that exists in nature. These types of energy include water, sun, wind, geothermal waters, geysers, waves, rising and falling water levels, volcanoes, lightning, various currents in oceans and seas, biomass, hydrogen fuel, urban waste, photosynthesis; may include photoelectric converters, chemical (galvanic) elements and others. These types of energy are called non-traditional and renewable energy sources. It is possible to produce clean ecological energy only from the above-mentioned energy sources. In the article, an experimental study and analysis of the operating modes of an uninterruptible power supply using a wind generator as a primary source

KEYWORDS

Clean ecological energy, wind generator, electric generator.

INTRODUCTION

Experimental studies of the working modes of the developed UTM structures were conducted in the laboratory of the Department of "Electronics and Instrumentation" of the Fergana Polytechnic Institute.

In the process of conducting experimental research, a wind generator was selected as the primary energy source of UTM.

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An image of the developed wind generator is shown in Figure 1.

Figure 1. General view of the wind generator.

This wind generator is low power (500W) and is mobile. This wind generator has a compact construction and can be installed in different places and in a short time. Such wind generators can be used for farms, low-power consumers, in alarm systems, lighting systems of newly built houses, in the use of computers, as well as as a power supply source for telecommunications, radio stations, medical systems, and household radio-electronic equipment. intended. The use of an electric generator based on permanent magnets in the wind generator allows operation without a step-up reducer, which in turn reduces noise and losses and increases the reliability of the device. The energy efficiency (coefficient of wind performance) of airplane blades is 2-4 times higher when they have a very flat surface [1-7].

Constituent parts of the wind generator. The wind generator consists of the following parts: the turbine of the wind generator; wind generator mast (mast); the tail part of the wind generator; wind generator blades; wind generator fasteners; mast cables; turning mechanism [8-11].

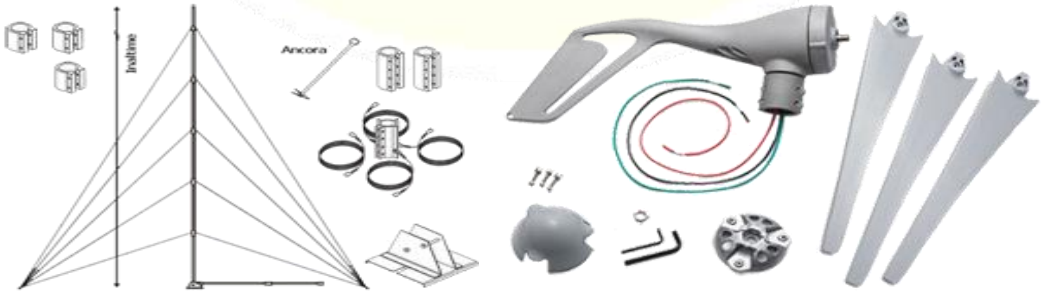

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Figure 2. Components of a wind generator.

The following table shows the technical characteristics of the wind generator.

Table 1. Technical characteristics of the wind generator

MODELS		ALT-200	ALT-300	ALT-400	ALT-500	ALT-600
Rated power (W)		200	300	400	500	600
Rated voltage (V)		24				
The diameter of the wind wheel (m)		2.2				
Initial speed (m/s)		2,5	2,5	2,5	2	2
Protection mode (m/s)		6	12	12	8	8
Optimum wind speed (m/s)		35				
The way the gondola rotates downwind		Mechanic				
Nominal rotation speed of the blades (rpm)		550	530	510	450	420
Generator type		Permanent magnets				
The material of the hair		Made of high-quality fiberglass				
Number of wings		3				
Column built in drawers	Height, m	6				
	Diameter, mm	48			89	89
A solid column	Height, m	8				
Recommended batteries and their number, pcs		12V, 150AHx2	12V, 150AHx2	12V, 150AHx2	12V, 200AHx2	12V, 200AHx2
Converter type (voltage converter)		Sinusoidal				

Using a wind generator as the primary energy source of a mobile uninterruptible power supply, the dependence of the UTM output power on the nature of the load was considered, based on which the power transfer coefficient was calculated depending on the type of load [12-24].

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Table 2. Dependence of the output power on the nature of the load

Download type	Load capacity factor	Power transmission coefficient, %
Inductive	0,7	88
	0,75	94
	0,8	100
	0,85	100
	0,9	100
Resistive	1,0	100
Capacity	0,95	94
	0,9	87
	0,85	80
	0,8	74
	0,75	68
	0,7	62

In the process of conducting experimental research, that is, the UTM currents and voltages were measured using an oscilloscope, which used a wind generator as the primary energy source of a mobile uninterruptible power supply.

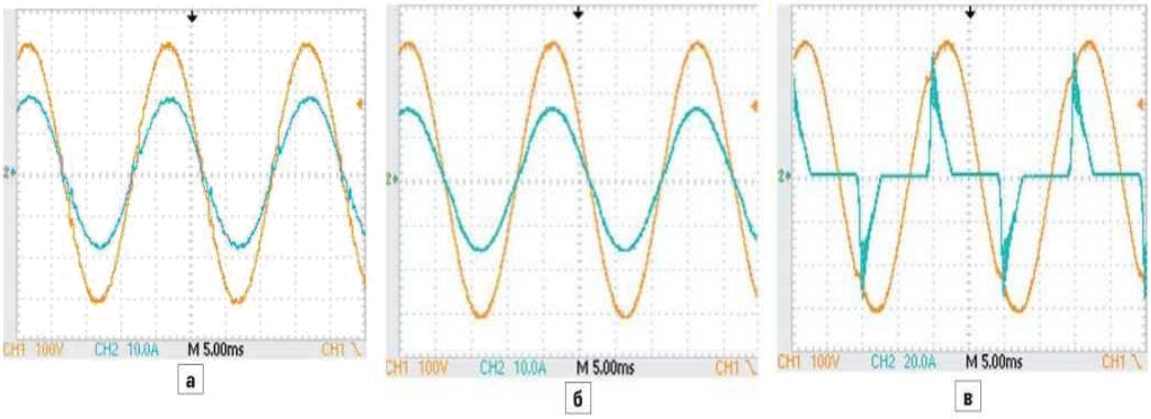

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Figure 4. Oscillograms of currents and voltages: a) at the UTM input; b)at the output of UTM in linear loading; at the output of UTM in nonlinear loading.

Using a wind generator as the primary energy source of an uninterruptible power supply, the dependence of the output power of the UTM on the nature of the load was considered, based on which the power transfer coefficient was calculated depending on the type of load.

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