ANALYSIS OF POWER DISSIPATION IN A TRIANGLE CONNECTION OF SINGLE-PHASE ASYNCHRONOUS MOTOR SUPPLIED FROM SOLAR ENERGY SOURCE

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Abstract. *The demand for all types of energy in the world and in our country is increasing day by day, in which the importance of renewable energy sources occupies a special place. It is considered one of the most advantageous aspects, today the most electric power-consuming device of consumers of solar energy sources, as well as conventional energy resources, is asynchronous motors. difference from three-phase, its mechanical characteristics, study and introduction of asynchronous motors for the energy developed by the solar panel into the production of brands, are considered urgent issues. When one and three-phase asynchronous motors are connected to solar energy sources in an off-line and on-line system, the power consumption is changed to a signal form through electromagnetic current converters in the control and management, and the consumed electric power is transferred to the primary one. The results of modeling of the effects of signal change magnitude and parameters on the physical and technical processes taking place based on the structure of the change device are presented.*

Keywords*: single-phase asynchronous motor, solar energy source, reactive power control, conductor selection, capacitor bank, magnetic flux, connection group, current transformer, dynamic characteristic, differential connected condition, network connection.*

Introduction. Today, in order to meet the energy demand of the population and industrial enterprises, a number of researches and projects are being carried out in our country, as well as in the whole world, in order to generate environmentally friendly, cheap, high-quality electricity without using primary fuel and deliver it to the population, including the solar energy source, ecological generating electricity by building solar and power plants suitable for the regions without using clean primary energy and providing quality electricity to the consumers of the generated electricity by providing quality electricity in places close to the consumers and choosing the correct transmission materials. Nowadays people are chasing alternate energy sources due to the paucity of non-renewable energy sources. Because of which they are moving towards renewable energy sources. Renewable Energy is used to give energy in following areas: electricity generation, air, and water heating or cooling and transportation. Based on the issues of conductivity and isolation, it is necessary to use modern technologies to control and manage waste in devices, including electromagnetic current converters are widely used to control and manage reactive power waste in asynchronous motors. Taking into account that it consumes %-65%, we studied the analysis of its physical and technical processes we used the method:

$$C_1 = 2860\frac{I_I}{U_I} = \frac{0{,}86A}{220V} = 11{,}18\ [\text{mkf}] \qquad C_1\text{- working condenser}$$

$C_2 = 2860\frac{I_I}{U_I} = \frac{0,86}{220} = 10,71$ [mkf] C_2- starting capacitor

We connected two selected capacitor batteries in parallel between the phases of the asynchronous motor B and C.

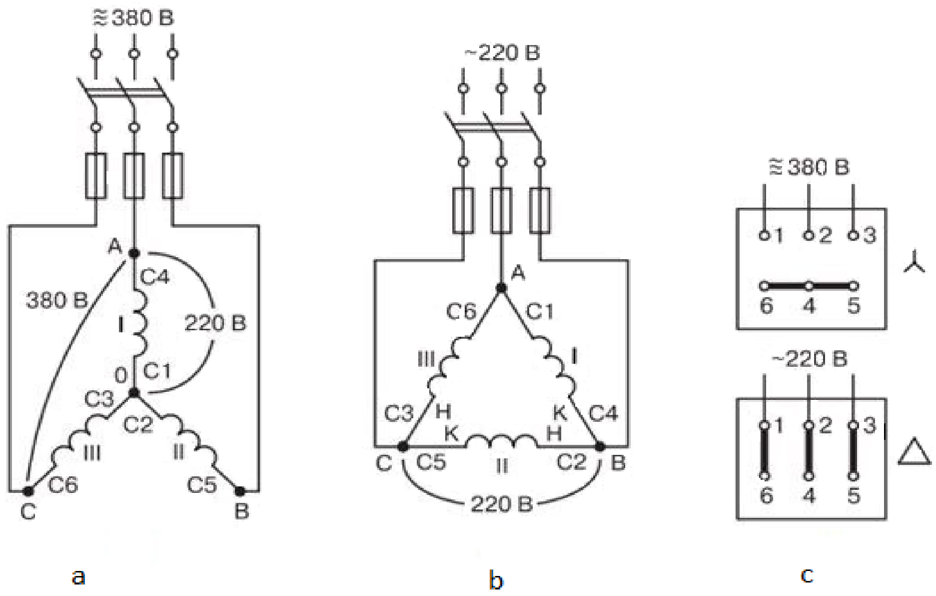


Figure 1. In expressions a), b), c)- connection of a) three-phase star, b) delta-shaped single-phase network

Star or delta connection of asynchronous motor stator windings is widely used in the industry, it is possible to supply voltages of 127/220 or 220/380V in two voltages of the asynchronous motor network with \sqrt3 ratio. We used the Triangle method to connect to the renewable energy source network and started the asynchronous motor using capacitor batteries, the asynchronous motor worked in single-phase normal mode.

Amplitude asymmetry occurs in asynchronous motors powered by a solar source, phase asymmetry and angular asymmetry exist, which in turn leads to asymmetry of the magnetic currents in the motor.

$$\Phi_A(\theta,t) = \frac{1}{2}\Phi_m\{\sin(\theta-\omega t)+\sin(\theta+\omega t)\}$$

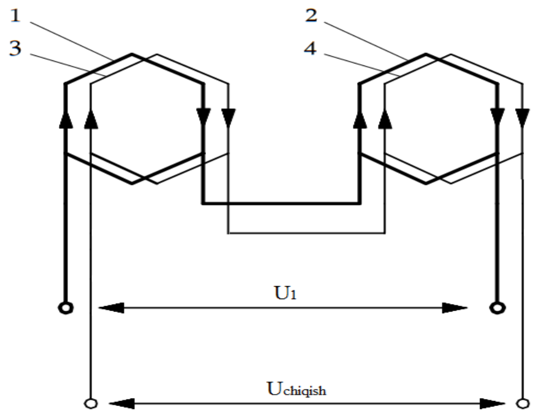
$$\Phi_B(\theta,t) = \frac{1}{2}\Phi_m\left\{\sin(\theta-\omega t)+\sin\left(\theta+\omega t-\frac{2\pi}{3}\right)\right\}$$

$$\Phi_C(\theta,t) = \frac{1}{2}\Phi_m\left\{\sin(\theta-\omega t)+\sin\left(\theta+\omega t)-\frac{4\pi}{3}\right)\right\}$$

In the expression, θ-theta is the angle between the magnetic flux and the stator current, Фm-is the main magnetic flux.

In order to measure the reactive power dissipation of the asynchronous motor, we placed the wire coil, which is the same as the parameters of the stator wire wires, in the gap between the wedges in the stator groove. We investigated whether it is possible to determine the non-sinusoidal nature of the power consumption, the failure of the dosimetry, and prevent the accident that may occur in the operation of the asynchronous motor. In an asynchronous motor supplied from a solar energy source, for certain reasons, due to high and low harmonic currents generated mainly in the stator, non-sinusoidal currents also appear due to the violation of even and odd harmonics.

Due to the fact that even harmonic currents are compensated in the magnetic field of the device, their effect is almost non-existent. High harmonics mainly cause overheating of asynchronous motors and reduction of active power factor.



1,2,3,4 are designed to fit the current transformer to the stator blades of the asynchronous motor.

Picture 2. an electromagnetic current transformer placed in a suitable order between the stator blades of an asynchronous motor

An asynchronous motor is placed in wedges in a suitable order with three-phase current transformers and stator coils. The output voltage signal from the current transformer represents the stator current. The output voltage signal depends on the main and leakage magnetic flux and the number of windings of the current transformer. The advantages of this current transformer over others are that it can measure the stray magnetic current in asynchronous motors, simplicity and low cost. In evaluating the asymmetry and non-sinusoidal of the asynchronous motor through the information obtained from the output signal of the electromagnetic current converter that we are researching, the possibility to control the efficiency of the device and the power loss is considered to be one of the most advantageous aspects.

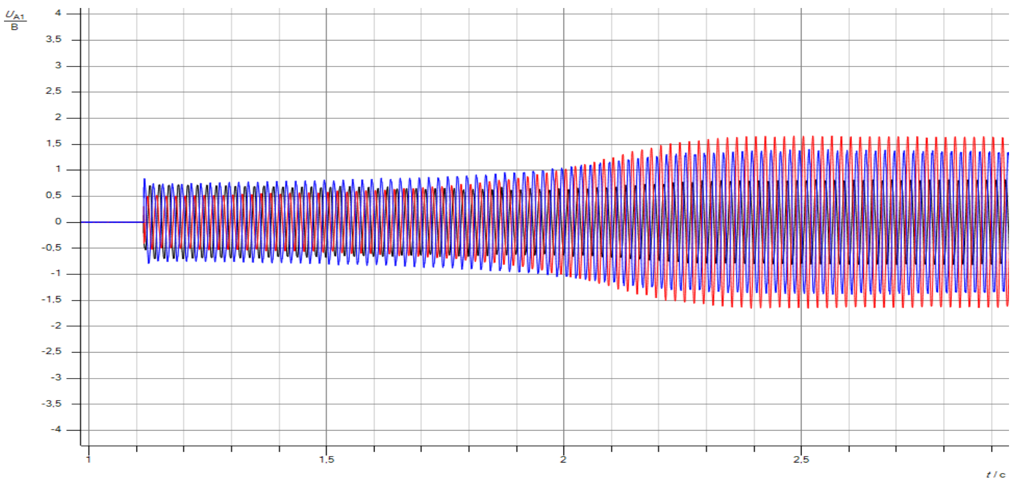


Figure 3. Dynamic characteristic of an electromagnetic current transformer placed in a suitable order between the stator blades of an asynchronous motor

This figure shows the dynamic diagram of a single-phase electromagnetic current converter of an asynchronous motor. Figures show non-sinusoids and asymmetries in phase A when an asynchronous motor is supplied with solar energy.

Conclusion

From what has been discussed and analyzed above on the topic It can be concluded that when evaluating the unpleasant situations that occur in an asynchronous motor with the help of electromagnetic current transformers placed in the stator slots of an asynchronous motor, the most important thing is the increase in energy consumption, the burning of the motor stator, the mechanical condition of the device in the case of relying on the information obtained from the current transformer, the ability to assess the failure is considered one of the most advantageous aspects of the current transformer. This electromagnetic current converter can be used in all types of asynchronous motors supplied with renewable and conditional fuel.

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