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CALCULATION OF POWER WASTE IN ELECTRICAL NETWORKS

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Abstract:
The quality of electricity in the territory of our republic mainly depends on current and narguz, taking into account the interaction of magnetic currents used in the control and management of currents of electric power supply networks, frequency, voltage, currents. In winter, we can use it to improve the quality of electricity. Today, the demand for electricity is increasing. On this scale, we can use it for the purpose of reducing the length of the line in order not to increase the power loss in the overhead line. If we increase the tension, we eliminate it, we need to choose the cross section of the wire in the line. the results of the study are presented.

Keywords: electricity, tokens, power waste, control, voltage, magnetic current, element, Rogovsky belt – foundation, gercon, working state probability, model, reliability indicators, ability to work.

The waste of active and reactive power in three-phase variable token lines is calculated by the following formulas if we do not take into account the line's conductivity (***V***= 0, ***G***=0):[1]

$$\Delta P = 3I^2 r = 3(I_a^2 + I_p^2)r \qquad (1)$$

$$\Delta Q = 3I^2 x = 3(I_{\text{à}}^2 + I_{\text{ð}}^2)x \qquad (2)$$

Here *r* and *x* are the active and induced resistance of the line; I_a and I_R are the active and reactive organizers of *load I* until full.

As you know,

$$\text{Đ} = \sqrt{3}UI\cos\varphi; \quad Q = \sqrt{3}UI\sin\varphi. \qquad (3)$$

Through its active and reactive organizers, the full token

$$I\cos\varphi = I_a, \quad I\sin\varphi = I_p \qquad (4)$$

ifodalaymiz:

We put the values I_a and I_R (3):

$$\text{Đ} = \sqrt{3}I_a U, \quad Q = \sqrt{3}I_p U. \qquad (5)$$

From

$I_a = \frac{P}{\sqrt{3}U}; \quad I_p = \frac{Q}{\sqrt{3}U}$ By placing expressions (1) and (1), we produce the following important expressions:

$$\Delta P = 3I^2 r = 3\left(\frac{P^2}{3U^2} + \frac{Q^2}{3U^2}\right)r = \frac{P^2 + Q^2}{U^2}r = \frac{S^2}{U^2}r \qquad (6)$$

$$\Delta Q = 3I^2 x = 3\left(\frac{P^2}{3U^2} + \frac{Q^2}{3U^2}\right)x = \frac{P^2 + Q^2}{U^2}x = \frac{S^2}{U^2}x. \qquad (7)$$

S full capacity here.

In terms of the expressions taken above, we produce the following hulosas:

1. The waste of active and also reactive power depends on *waste R* and *Q*.

2. Reverse proprietary to the waste voltage square. Therefore, increasing the voltage to a small value greatly reduces power waste. But raising the voltage requires additional funding costs. [2]

3. In the presence of loads connected in several sequences during the line (4.1,a-rsam), the waste of power in it consists of a sum of power waste in each area, i.e.

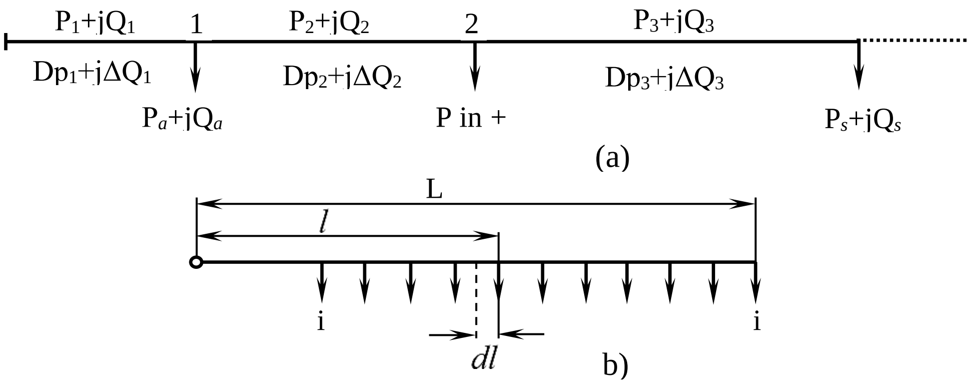
$$\Delta P_z = \Delta P_1 + \Delta P_2 + \Delta P_3 + \cdots + \Delta P_n,$$

$$\Delta Q_z = \Delta Q_1 + \Delta Q_2 + \Delta Q_3 + \cdots + \Delta Q_n.$$

HereΔR_1, ΔR_2, ... andΔQ_1, ΔQ_2,... is determined by expressions (6) and (7) respectively.

Power waste when distributed for a year during the length of the line. At the entire length of the line, we accept that the cutting surface of the conductor is the same:

We mark the load of the line in the length unit through i_0,



4.1- расм.

ya'ni *and$_0$=I/L*, A/km. Ta'minlovchi liniyaning boshlanishidagi *l* uzunlikdagi qismining *dl* masofasidagi yuklama idl ga tengdir. [3]

The resistance of the dl length of the line is the waste of power caused by the flow of the vine through r_0dl:

$$d(\Delta P) = 3(il)^2 r_0 dl$$

To determine the total power waste$R\Delta$ on the entire visible *L* length line, we add all very small waste *d*(*R*) Δvalues between 0 and *L*, i.e.:

$$\Delta Đ = \int_0^L 3(i_0 l)^2 r_0 dl = 3 i_0^2 r_0 \int_0^L l^2 dl = 3 i_0^2 r_0 \left| \frac{L^3}{3} \right|_0^L = I^2 r = \frac{P^2 + Q^2}{U^2} \cdot r. \qquad (8)$$

Y it's in the order in the snow

$$\Delta Q = I^2 x = \frac{P^2 + Q^2}{U^2} x. \qquad (9)$$

Thus, when the load is distributed uniformly during the line, the power waste is three times less than in the same position at the end of the line. We make sure of this by comparing expressions (4), (5), (8), (9). [2]

The three-phase system is practically very common. In such a system, the same power and power are less intense than in a single-phase system. Let's compare wastefulness in these systems.

Uch fazali tarmoqlar uchun

$$S = \sqrt{3} U I_3, \qquad I_3 = \frac{S}{\sqrt{3} U}. \qquad (10)$$

A phased tarmoqlar uchun

$$S = U I_1, \qquad I_1 = \frac{S}{U} \varphi. \qquad (11)$$

Uch fazali tarmoq uchun quvvat isrofi

$$\Delta P_3 = 3 I_3^2 r_3, \qquad \Delta Q = 3 I_3 x_3. \qquad (12)$$

Power waste for single-phase network

$$\Delta P_1 = 2 I_1^2 r_1, \quad \Delta Q_1 = 2 I_1^2 x_1. \qquad (13)$$

If we put (10) and (11) respectively (12) and (13), the following will be produced:

uch fazali tarmoq uchun quvvat isrofi

$$\Delta P_3 = \frac{S_2}{U_2} r_3, \quad \Delta Q_3 = \frac{S^2}{U^2} x_3; \tag{14}$$

power waste for single-phase network

$$\Delta P_1 = \frac{2S^2}{U^2} r_1, \quad \Delta Q_1 = \frac{2S^2}{U^2} x_1. \tag{15}$$

(14) and (15) compare and produce the following conclusions. Indeed, the waste of power in three-phase networks is twice as low as in one-phase networks. However, the one-phase system has two conductors and three-phase switches. To make the metal waste homogeneous, it is necessary to reduce the cutting surface of the conductors in a three-phase network 1.5 times compared to the same phase. In this case, the resistance increases 1.5 times, i.e. r_3=1.5r_1. *Δ* If we put this value in expression for R 3, we will generate:

$$\Delta Đ_3 = (1{,}5S^2/U^2) r_1$$

Therefore, the waste of power in one-phase networks is 2/1.5=1.33 times greater than in three-phase networks. [3]

The waste of active and reactive power in transformers and autotransformers in a salt working state is *RΔ*$_s$, *QΔ*$_s$ (in g_t and *b* t conductivity) and R in a short circuit*Δ* $_T$, *ΔQ*$_T$ (in the r_t and x_t resistance of deserts) are divided into waste. Conductivity in calculating power transmission lines by taking into account transformers is taken into account in the form of a suitable load of g_t and b_t conductivity, into the transmitted power equation (on the balance sheet.

The active power waste caused by the magnetization in the transformer pipe and the sleeping tokens is the nominal voltage given as the transformer's passport information under *it* (in a salt working state) Active conductivity is defined as a waste on Mount G_T. The resulting embryo was allowed to develop in nutrients and then inserted into her $_{\text{woe}}$, where it implanted:

$$\Delta P_{пул} \approx \Delta P_c \approx U_н^2 g_т \tag{16}$$

Here *ΔR* is an active power that is wasted in the steel of a monetary transformer (i.e. usually made of steel itself). [4]

The reactive power spent on the magnetization of the transformer (*Q* is determined by reactive conductivity b_t) uses the transformer's salt processing token, which is given at an interest rate relative to the nominal token will be found. Since the active part of the salt processing token is very small, assuming $I_{is\ money}$=0, the magnetic power will be as follows:

$$\Delta Q_{пул} = \Delta Q_c = \frac{I_c\% S_н}{100} = U^2 b_т \tag{17}$$

The active power waste (referred to as the waste of power in copper) (6) can be found in the formula:

$$\Delta P_т = \frac{P^2 + Q^2}{U_н^2} r_т \tag{18}$$

Similarly, the loss of reactive power caused by the spread of magnetic current can be determined as in the formula (7):

$$\Delta Q_т = \frac{P^2 + Q^2}{U_н^2} x_т \tag{19}$$

(18) VA (19) Ifodalardagi Kuchlanish Transformer Bevosita Ulangan Hisoblanayotgan Liniyaning Nominal Kuchlanishidir.

The waste expression (18) in the desert of the transformer can also be described in a different light than that of the transformer. It is known that in the short circuit experience, *I=I*$_N$ is determined by the active power waste as follows:

$$\Delta P_к \approx 3I_н^2 r_т = \frac{S_н^2}{U_н^2} r_т.$$

Inanother value of the cylinder, the active power waste in the transformer is found in the same ways:

$$\Delta P_т = 3I^2 r_т = \frac{S^2}{U_н^2} r_т.$$

The relationship is *Δ*$_{\text{derived}}$ from *R t/RΔ*$_k$ as follows:

$$\Delta P_т = \Delta P_к (S/S_H)^2. \tag{20}$$

If we *Δ* replace x_t in the expression (19) for Q_t with its (3.14) expression, we will have the following formula:

$$\Delta Q_{\text{т}} = \frac{u_k\%}{100} \cdot \frac{S^2}{S_н}. \quad (21)$$

(18) and (19) expressions for two-swamped and, as well as three-steppe transformers and autotransformers, to determine the waste of power in any case of loading in their deserts is eligible. Loading the desert instead of the total load of the transformer in the formula, as well as r_t and x_t resistance when calculating waste in a desert of a three-swamp transformer or autotransformer instead, the resistance of the suitable desert is laid. (20) and (21) formulas are divided into low-powered deserts, and their loads are also suitable for waste in two-swamp transformers of the same kind. [1]

Thus, the total active, reactive, and full power waste in the transformer is as follows:

$$\begin{aligned} \Delta P_{\text{т}\Sigma} &= \Delta P_{\text{т}} + \Delta P_c \\ \Delta Q_{\text{т}\Sigma} &= \Delta Q_{\text{т}} + \Delta Q_c \\ \Delta S_{\text{т}\Sigma} &= \sqrt{\Delta P_{\text{т}\Sigma}^2 + \Delta Q_{\text{т}\Sigma}^2} \end{aligned} \quad (22)$$

REFERENCES

1. Pardaboyev A. et al. THE BIBLE'S VIEWPOINT OF THE BIBLE'S VIEWPOINT OF THE BIBLE'S VIEWPOINT 2 (105). – С. 269-273.
2. Nabijonovich J. A. et al. CURRENT ISSUES OF ENERGY AND THEIR ELIMINATION //INTERNATIONAL JOURNAL OF RESEARCH IN COMMERCE, IT, ENGINEERING AND SOCIAL SCIENCES ISSN: 2349-7793 Impact Factor: 6.876. – 2022. – Т. 16. – №. 01. – С. 32-35.
3. Nabijonovich J. A. et al. MAIN WAYS TO ACHIEVE ENERGY SAVINGS IN ELECTRIC POWER PLANTS //INTERNATIONAL JOURNAL OF SOCIAL SCIENCE & INTERDISCIPLINARY RESEARCH ISSN: 2277-3630 Impact factor: 7.429. – 2022. – Т. 11. – №. 05. – С. 5-11.
4. Nabijonovich J. A. et al. ELECTRICITY OF COMPRESSORS AND FANS ENERGY SAVING WORK MODES //INTERNATIONAL JOURNAL OF SOCIAL SCIENCE & INTERDISCIPLINARY RESEARCH ISSN: 2277-3630 Impact factor: 7.429. – 2022. – Т. 11. – №. 05. – С. 1-4.
5. Хантўраев И. М., Жуманов А. Н. ЭЛЕКТР ТАРМОҚЛАРИДА ҚУВВАТ ИСРОФЛАРИНИ ҲИСОБЛАШ //Academic research in educational sciences. – 2021. – Т. 2. – №. 5. – С. 330-337.
6. Djumanov A. N. et al. METHODS OF TESTING CURRENT TRANSFORMERS // SCIENCE, SOCIETY, INNOVATIONS: TOPICAL ISSUES AND MODERN ASPECTS. – 2021. – P. 264-270.
7. Жуманов А. Н. и др. ЭЛЕКТР ЭНЕРГИЯ ИСРОФИНИ АНИҚЛАШ УСУЛЛАРИ //Academic research in educational sciences. – 2021. – Т. 2. – №. 4. – С. 466-470.
8. Жалилов Ў. А. Ў. и др. ЭЛЕКТР ЭНЕРГИЯ СИФАТ КЎРСАТКИЧЛАРИ ВА УЛАРНИ ОШИРИШ ЧОРА-ТАДБИРЛАРИ //Academic research in educational sciences. – 2021. – Т. 2. – №. 4. – С. 113-118.
9. Djumanov A. N. et al. Measuring current transformers // World science: problems and innovations. – 2021. – P. 76-78.