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Improving the efficiency of electric power transmission lines

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ABSTRACT- *The electrical transmission lines transfer the electrical power from one place to another. The main component of the air transmission line is the conductor. The rest of the parts are auxiliary parts to carry the conductor or to isolate the conductor from the ground. In overhead lines, open, non-insulated conductors are used, and the air is the insulator between the conductors, each other along the line path. Therefore, the overhead lines are called. The conductor is the main part of the transmission line as it is the carrier that transfers electrical energy from one place to another and the conductors used in transmission lines are often exposed, i.e. not covered by an insulating material and are suspended between poles or towers that are far from each other distances that may reach more sometimes From 250 meters, this distance is known as the tower or sea wire.*

Keywords- *electric power, transmission lines, overhead lines, tower.*

I INTRODUCTION

The transmission lines are the arteries of the electric power system, and the emergence of advanced transmission lines with high capacities made it technically and economically possible to transfer electrical energy over very long distances. The electric power is transported by means of continuous alternating current, with the design of the line using one of the following types:

(Overhead lines)

(Ground cables)

(Insulated lines with compressed gas)

Many researchers discussed improving the efficiency of these lines, as electricity is an important issue and the strongest nerve on which all fields of the individual and society are based, including economic progress, investment, local production, education, and other sectors that concern societies.

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Ground cables and overhead lines are according to many economic and technical factors such as the cost of the conductor - the cost of the insulator - the cost of installation In addition to these economic factors, there is a factor that limits the use of cables to transmit power at high efforts and long distances as in the case of the cable the capacitive value of the cable is greater than the inductance For the cable and the charging current is very large, which causes a large increase in voltage. Therefore, to transfer a large amount of capacity over long distances with high efforts, cables cannot be used, but the overhead lines are used.

What are the transmission lines of the electrical power:

Most power transmission lines are designed to operate in the Phase system3 and non-insulated (bare) conductors are used in the overhead lines, making use of the surrounding air as an insulating medium.

The air lines around the transmission of energy surround the electromagnetic fields, and these fields raise concern in terms of the presence of some studies that indicate the presence of health and environmental visions on the neighboring organisms. In addition to interfering with the communication waves of Interference when the super effort and when there is a corona discharge, as a result of many factors, such as the contamination of electrical insulators for security purposes or other reasons, the power is transmitted by ground cables, in this chapter we will focus on short and medium air lines due to its spread and frequent use For ease of installation and operational needs compared to ground cables.

The study of transmission lines depends primarily on the electrical performance properties of the transmission line, and these are characteristics that can be expressed by the characteristics of the four lines, arranged according to their importance:

(Line inductance XL)

(Line capacity C)

(Parallel to the G line)

The transmission lines are classified into short, medium and long depending on the length of the line. The difference between these types is in the parabolic circle, where the medium and long lines appear parallel to the line, unlike short lines.

Insulating materials used in transmission lines

II Insulating material

They are much more disabling than conductivity, such as wood and ceramics

Porcelain insulator is used:

- 1 to isolate the conductors from the tower body.
- 2 It is used between the conductors to spindle them together.

The characteristics that should be available in overhead lines are as follows:

1 - The voltage should be as constant as possible along the line.

2 - The power loss should be minimal.

3 - The loss should not cause the conductors to heat up to a great degree.

4 - The conductor must bear mechanical stresses.

III Conducting material

It has much higher conductivity than resistance or obstruction, such as copper and gold

Semiconducting material:

It has the property of conductivity almost equal to the property of disability, that is, we cannot say about it as a conductor

Good and no good insulation like silicon and germanium

What gives substance good conductivity of electricity, and another good insulation?

Any substance contains a large number of atoms that make up its molecules, and those atoms contain

A number of electrons in its outer orbit, those electrons in the outer orbit

They are called "free electrons", because they are easily driven from their orbit and made to travel easily into an atom

Another, then to another atom, and so on, the process of passing electrons is called an electric current

1- The substance that contains a large number of free electrons becomes well connected to electricity.

2- A substance that contains a small number of free electrons becomes poor conduction of electricity.

Materials used in the manufacture of conductors:

And the fact that the conductor is suspended makes it always located under the influence of its weight, which affects vertically downward causing tension in the conductor, and therefore, the material from which the conductor is made must be of high mechanical strength that makes it endure the stress on it, to be light in weight until the tensile strength affecting me The conductor is few and even the distance between the towers can be increased to reduce the cost of constructing the line.

In general, the choice of conductor material in transmission lines is subject to several considerations:

1- The distance between the two towers.

2- Tension in transportation.

3- Is the line vulnerable to vibrations or not?

4- Loss of power on the line.

5- The drop in voltage on the line.

6 - Weather and climatic factors at the line location.

7 - The area of the conductor section or the size of the conductor.

Characteristics of materials used in the transportation industry

(1) Conductivity:.

(2) Mechanical Strength:

Mechanical durability is measured by the maximum stress incurred by the material, since the greater the durability-to-weight ratio, the higher the step of the tower and the lower the cost of constructing the line.

(3) Modulus of Elasticity:

The elongation of the conductor under the influence of the tension stress on it leads to a decrease in the area of the cross section, which leads to a weak and interrupted conductor.

(4) pansion coefficientHeat ex:

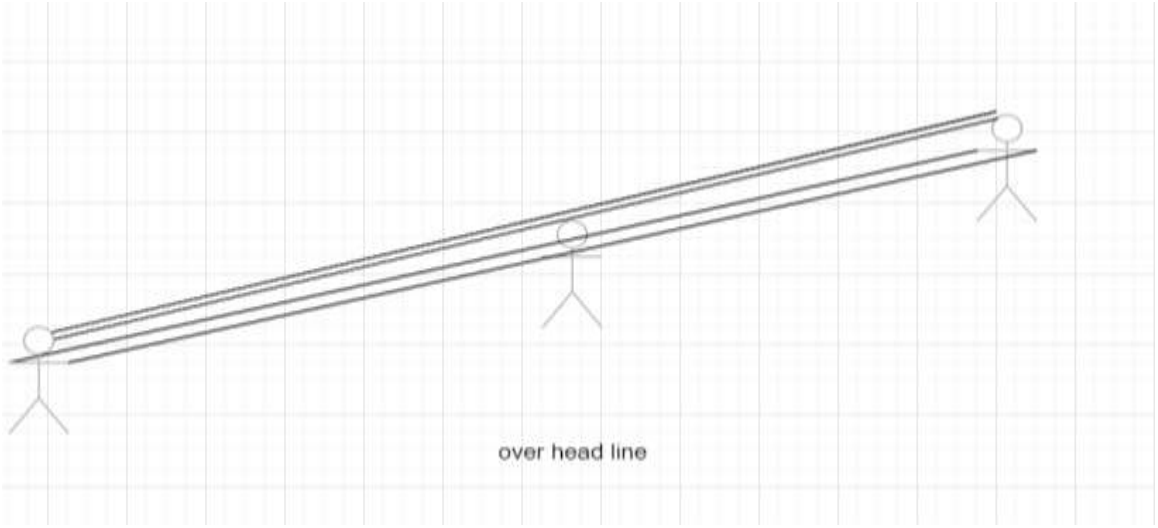
It is preferable to make the conductor from a material with a small coefficient of thermal expansion, as the air transport lines are subject to climatic changes due to their presence in the open.

(5) Cost:

And the cost is one of the most important factors affecting the choice of conductor material in order to keep the cost of transmitting electrical energy as low as possible.

Overhead Lines

Air transmission lines are the main artery for the transmission of electrical power from generation centers to Distribution stations. Therefore, the transmission line must be able to withstand all conditions and changes that may be made Changes occur during breakdowns.



The problems faced by the overhead lines in the distribution network:

1- Jumpers break by the line and sometimes fire due to looseness in the fastening where it increases

2 - Interruptions of catastrophes, i.e. ends of the connection between the antenna and the cable head, often due to a cause.

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Malfunction in the Overhead lines or due to the difference of the material from which the downlight is made (copper) from the conductor material.

By Overhead lines (aluminum), which leads to corrosion of the conductors and the occurrence of looseness in the fastening, and accordingly

Weak point appears in the line.

3- The presence of trees in the tracks of the lines causing a lack of insulation due to the accumulation of dust on the insulators, which leads to interruptions in the electrical supply. The movement of its branches in the short circuit sometimes it leads to cutting wires.

IV Power cable

It is one of the components of the electric power system; it transmits electrical energy from one place to another and provides electrical feeding of electrical loads at different levels of tension. It is often used in distribution and delivery networks. The cables expanded outside the buildings, either buried to the ground in a special trench (Figure 1), or within a special concrete channel, or they were pneumatic on columns. And it is extended inside the buildings, either hidden within plastic tubes, or shown on metal stands

Consists of:

1- Electrolytic substance (or several conveyors)

2- Electrically insulating material surrounding the conductor (or each of the conductors separately)

3- The casing, the most important of which are lead, aluminum and plastics.

4- Reinforcement, this is done because of insulated cables being mechanically weak. Reinforcement is carried out with one or several layers of tape or steel wires or others. Filling material (paper and canvas) is usually added between the reinforcing layer and the cover.

5- Protective Cover: Where the cables are covered with a material of elastomers or rubber to protect them from rust.

V Conclusions

1- It is not allowed to make joints or weld the joints in the junction distance, and the distance should not be less

The header between the conductors and the ground level is at a maximum margin of 5 meters

2- The horizontal distance between the low pressure conductors and the buildings should not be less than 1.5 meters from

Windows and balconies not less than 1 meter between them and the walls

3- The horizontal or vertical distance between the conductors and the trees must not be less than a meter

4- The vertical distance between the low voltage lines and the crossed intermediate lines should not be less than 2.5 meters when the distance between the two medium voltage columns exceeds 188 meters and not less than 2 meters in the case if the distance between the two medium voltage columns is less than 188 meters.

VI Recommendations

1- The low voltage line must pass above the telephone line where the vertical distance between the low voltage line at the maximum temperature and the telephone line is not less than 1.25 meters.

2- When a low voltage line passes next to a telephone line, the horizontal distance between them should not be less than 2 Meters and in special cases 1 meter.

REFERENCES

1. Acha, E., Agelidis, V. G., Anaya-Lara, O., & Miller, T. J. E. (2002).Power Electronic Control inElectric Systems, Ser. Newness Power Eng., 1st Ed. New York: Oxford, 7.
2. Ajami, F. (2009). The dream palace of the Arabs: a generation's odyssey. Vintage.
3. Akash, K., (2015). Reactive Power Compensation Using Fact Devices"National Institute Of Technologyrourkela-769008, Orissa, Pp.14-19
4. Aredes, M. (1996). Active Power Line Conditioners.Na.
5. Carvalho Filho, J. M., Leborgne, R. C., Da Silveira, P. M., & Bollen, M. H. (2008). Voltage Sag Index Calculation: Comparison Between Time-Domain Simulation And Short-Circuit Calculation. Electric Power Systems Research,78(4)
6. Hari, N., Vijayakumar, K., & Dash, S. S. (2011, March). A Versatile Control Scheme For UPQC For Power Quality Improvement. In Emerging Trends In Electrical And Computer Technology (ICETECT), 2011 International Conference On (Pp. 453-458). IEEE.
7. Mohanavel, P., & Raghavendiran, T. A. (2013). Artificial Intelligence Based Adaptive Power Oscillation Damping Controller For Power System Equipped With Upfc. IJREAT International Journal of Research in Engineering & Advanced Technology

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