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Reduction of Corona Losses in 115 and 230 kv Transmission Line

Manisha Chaudhary

Department of Electrical Engineering, PCTE institute of Engineering and technology Ludhiana (PB)

ABSTRACT

Generally Electrical power generated and transmitted long distance, that are away from the power generation houses is usually, badly effected by many kind of transmission losses, among them, corona loss is very famous, because of huge distortion of energy. This loss can be reduced by using bundle conductor. Hessian matrix determinant method use for stability test, the results leads to low corona losses with bundle conductor, where low passage of current is there. Multiple strand conductors like 2,3,4 and so on, are use here.

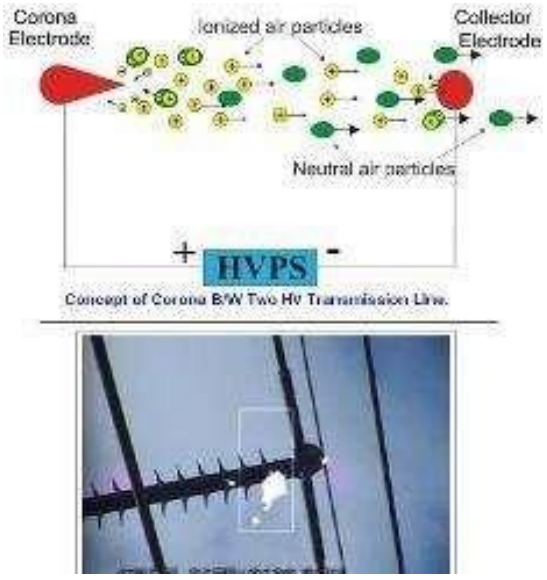
Keywords: Corona: corona loss, High voltage transmission line, Bundle conductors

1. Main Text

Now in days electricity is supposed to be very essential thing in our daily life in commercial as well as residential areas. Modern civilization is coming along with the increase in rate of demand. High voltage electrical energy transmission from power house to consumption areas generally done by steel towers. Due to overloading of transmission and distribution line, voltage instability and line power losses occurs, especially corona losses. So this paper will explained about corona losses and methodology to reduce it. The challenges continuously decrease the overall efficiency of transmission line, but some changes in line reduces some amount of corona losses.

Corona Loss

The ionized charges, surrounding the overhead conductor surface are responsible to create corona loss. High voltage, high ionization will there, and responsible for hissing noise with violet colour is refers as corona



The empirical formula to calculate corona losses is

Pc= 212.4/ δ (f+25)(Vp-Uc)2 √ r/d*10-5

Where Pc= Power loss due to corona in kw/km/phase

Vp= Phase to neutral voltage in kv

Uc= disruptive voltage in kv

f = frequency in Hz

r = radius of conductor in cm

d = spacing between the conductors in cm

δ= air density

II. EXPERIMENTS AND RESULTS

Experiment I: Under fair weather, of temperature 33 oC and air pressure was 761 torr.

Case I: In 115 kv line using 795 MCM, ACSR conductor and having radius 1.500 cm and average conductor spacing was 330 cm and length of the transmission line about 564 km.

Case II: In 230 kv line using 1273 MCM, ACSR conductor and having radius 1.76 cm and average conductor spacing was 330 cm and length of the transmission line about 564 km.

A) Disruptive critical and visual inception corona voltage spacing

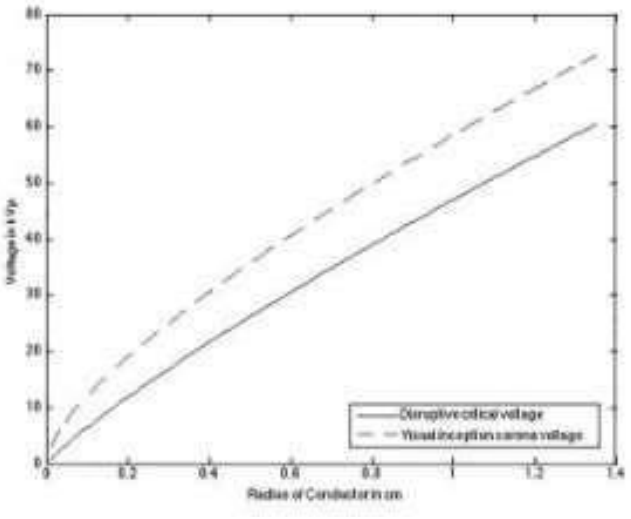


Fig.1 Disruptive and inception corona voltage in 115KV system

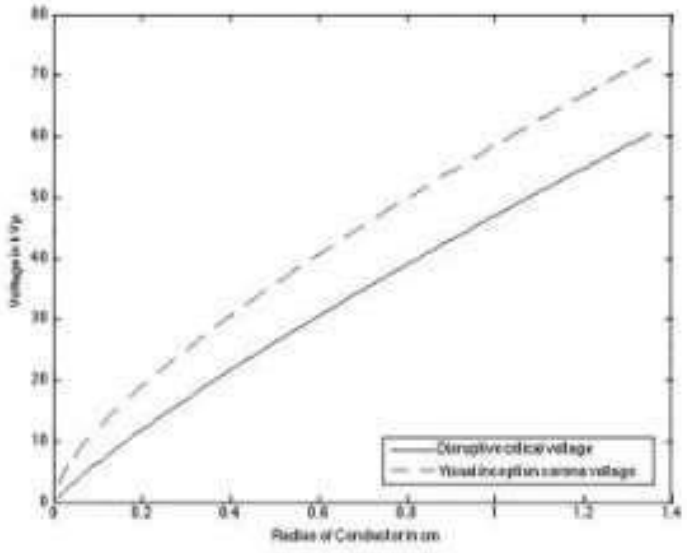


Fig.2 Disruptive and inception corona voltage in 230 KV system.

Fig. 1 and 2 shows that with the increase the radius of the conductor, would increase the disruptive and inception corona voltage.

B) Conductor spacing:

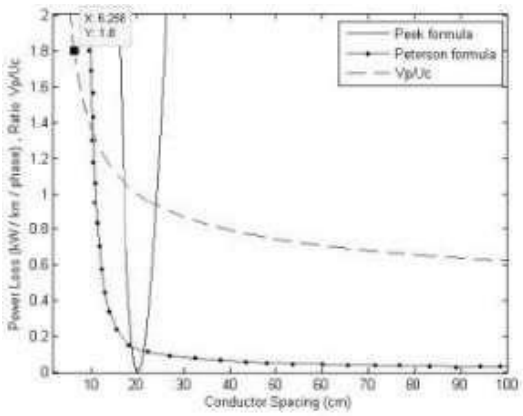


Fig.3 shows the loss due to conductors spacing in 115 KV line

These above figures 2 and 3 shows that Vp/Vc value must be less than 1.8. Higher the conductor spacing lesser be the corona losses will be there.

C) Radius of the conductors

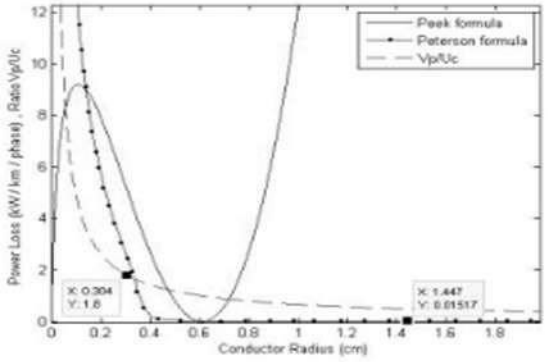


Fig. 4 Losses in conductor radius in 115kv line

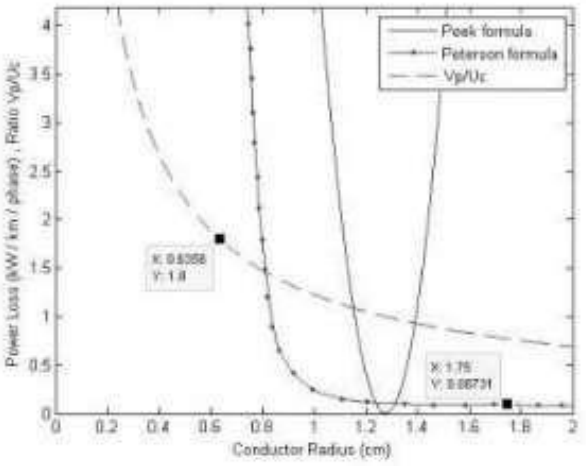


Fig.5 shows the loss due to conductors radius in 220 KV line

III. CONCLUSION

From these above experiments' results we are able to find out the power losses due to corona. With the help of formulas and graph we can analysis the occurrences of corona loss in 115kv and 220kv line transmission line. Surges in transmission line, leads the corona losses. Use suitable radius, proper spacing and reduce corona losses. So we have given focus on these above parameters for reduction of losses.

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