

Simulation and Performance Evaluation of Transmission Lines with Shield Wire Segmentation against Atmospheric Discharges Using ATPDraw

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Abstract : This paper aims to make a performance analysis of shield wire transmission lines against atmospheric discharges when it is made the option of sectioning the shield wire and verify if the tolerability of the change. As a goal of this work, it was established to make complete modeling of a transmission line in the ATPDraw program with shield wire grounded in all the towers and in some towers. The methodology used to make the proposed evaluation was to choose an actual transmission line that served as a case study. From the choice of transmission line and verification of all its topology and materials, complete modeling of the line using the ATPDraw software was performed. Then several atmospheric discharges were simulated by striking the grounded shield wires in each tower. These simulations served to identify the behavior of the existing line against atmospheric discharges. After this first analysis, the same line was reconsidered with shield wire segmentation. The shielding wire segmentation technique aims to reduce induced losses in shield wires and is adopted in some transmission lines in Brazil. With the same conditions of atmospheric discharge the transmission line, this time with shield wire segmentation was again evaluated. The results obtained showed that it is possible to obtain similar performances against atmospheric discharges between a shield wired line in multiple towers and the same line with shield wire segmentation if some precautions are adopted as verification of the ground resistance of the wire segmented shield, adequacy of the maximum length of the segmented gap, evaluation of the separation length of the electrodes of the insulator spark, among others. As a conclusion, it is verified that since the correct assessment and adopted the correct criteria of adjustment a transmission line with shielded wire segmentation can perform very similar to the traditional use with multiple earths. This solution contributes in a very important way to the reduction of energy losses in transmission lines.

Keywords : atmospheric discharges, ATPDraw, shield wire, transmission lines

Conference Title : ICPTSDPE 2019 : International Conference on Power Transmission Systems and Distribution in Power Engineering

Conference Location : Rio de Janeiro, Brazil

Conference Dates : March 04-05, 2019