

Improving Tower Grounding and Insulation Level vs. Line Surge Arresters for Protection of Subtransmission Lines

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Abstract : Since renewable wind power plants are usually installed in mountain regions and high-level lands, they are often prone to lightning strikes and their hazardous effects. Although the transmission line is protected using guard wires in order to prevent the lightning surges to strike the phase conductors, the back-flashover may also occur due to tower footing resistance. A combination of back-flashover corrective methods, tower-footing resistance reduction, insulation level improvement, and line arrester installation, are analyzed in this paper for back-flashover rate reduction of a double-circuit 63 kV line in the south region of Fars province. The line crosses a mountain region in some sections with a moderate keraunic level, whereas tower-footing resistance is substantially high at some towers. Consequently, an exceptionally high back-flashover rate is recorded. A new method for insulation improvement is studied and employed in the current study. The method consists of using a composite-type creepage extender in the string. The effectiveness of this method for insulation improvement of the string is evaluated through the experimental test. Simulation results besides monitoring the one-year operation of the 63-kV line show that due to technical, practical, and economic restrictions in operated sub-transmission lines, a combination of corrective methods can lead to an effective solution for the protection of transmission lines against lightning.

Keywords : lightning protection, BF rate, grounding system, insulation level, line surge arrester

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