

Modern Lightning Protection Technologies in Power Grids of China

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Abstract

Lightning is one of the top ten natural disasters identified by the International Decade for Natural Disaster Reduction (IDNDR). Lightning brings almost a catastrophe to a human society assuming the devastating amount of power it contains. Roughly, China suffers a loss of up to billions of dollars due to lightning strikes every year. Particularly, the power system, serving as the important pillar of the national economy, is so vulnerable to lightning strikes that it sustains massive direct and indirect damages because of its wide distribution. The safe and stable operation of power grids has been subjected to that serious threat for a long time, because about 40% of the power transmission line faults are caused by lightning strikes. With the rapid expansion of power grids, increased complication of grid structures, and the continuous development of smart grids and new energy technologies, lightning protection of power grids appears to be more and more prominent.

Given such circumstances, power grid of China had made rapid progress on lightning protection technologies and acquired many achievements. This presentation reviews these achieved progress and introduces that the lightning protection technologies are converting from extensive to specific and from qualitative to quantitative. In the presentation, a technical route of lightning protection technology is discussed in detail, that is to find problem by lightning detection and measurement, to analyze problem by lightning evaluation and simulating experiment, to solve problem by lightning protection scheme and measures, and to prevent problem by lightning risk's early warning. The corresponding devices and systems are also introduced with their practical applications and effects. Benefitting from these progresses, the lightning accident rate is remained steady to a comparatively low level in power grid of China in recent year although the length of the transmission lines increases very rapidly.