

Icing Observation and Analysis

of The $\pm 800\text{kV}$ Ultra High Voltage Direct Current

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The ice observation and analysis report of The JinShajiang $\pm 800\text{kV}$ ultra high voltage direct current (UHV DC) transmission line project includes 8 parts, they are the preface, the ice observation station(points) and observation method, the analysis of weather-chart, the results of ice observation, the analysis of ice character, the analysis of ice return period about 2008, the research of ice area division, and the conclusion.

1 Introduction

According to the programming of The JinShajiang $\pm 800\text{kV}$ ultra high voltage direct current (UHV DC) transmission line project, the UHV DC path several ice area as Daliang mountain, Wuling mountain, Dalou mountain, Wuling mountain, Xufeng mountain. These area is heavy icing and unsurveyed area, the accident of electric transmission line is recurrent, the design for anti-icing confront huge difficulty and danger. Setting up observation station(points) at the propriety place and conduct study of icing is an effectual way to solve the difficult problem of icing.

There are four quest item:

- (1) Setting up 4 observation stations and 20 points which represent different terrain and climate at the planning channel of transmission line for acquiring systematic data of icing and meteorological elements during 5 years.
- (2) Survey the character of the planning channel of transmission, especially the location of micro-relief and micro-climate, then make sure the unit icing weight.
- (3) Make sure the design ice region possibly and reliably in different route, and supply technique to selecting and optimizing the route plan for shunning ice.
- (4) Divide the design ice region possibly and reliably for the certain route plan.

2 The ice observation station (points) and observation method

2.1 Choose the ice observation station

According to the practical experience of ice observation and the character of natural environment, it is should satisfied 3 conditions when we choose the observation station.

- (1) Serious ice. There exist ice, the ice scale is much heavy, the ice course is frequent, and the station may observe enough master data.
- (2) Good representativeness. The weather and terrain condition of station is similar with the route of UHV DC.
- (3) Convenient life. There are necessary road nearby the station, short distance from town to insure the life material and the observation on the rails.

According to these 3 conditions, we determined the 4 ice observation station which named Xufengshan , Loushanguan, Luohanlin and Huangmaogeng.

2.2 Observed establishments and items

The ice observation stations lay glaze iron tower but the points lay glaze shelves.

3 The character annlysis of ice weather

This essay analyzed the circumfluence of 6 time's typical ice weather, there are 3 circumfluence types based on the weather system in upper air how to affect the route of transmission line, they are north high -south low, translot-Southern Branch slot, multi-straight fluctuate, then analyze the level of affect and frequency which derive the route area ice from these several atmospheric circulation.

4 The achievements of ice observation

Sort out the master data of observation, then count the number of ice times, ice extreme, ice increment, divided conductor ice, electrical insulator ice and the meteorological elements.

5 The research of area ice character analysis

According to the 5 years observed achievements, we researched the ice variety, ice density, ice time-histories and ice magnitude in different area.

6 The research of ice return period in 2008

Count the long sequence ice stylebook of Huangmaogen ice station, Jinfoshan weather station and Xuefengshan ice station use Peason III distribution, get the design ice thickness return period and the estimated value of ice return period in 2008.

7 The research of design ice region

The cardinal rule of generalizability ice region contains two aspect requires which both really reflect the ice character and convenient for engineering design, so define the height close, similar on geographical condition, same ice design thickness in identity climatic province as a ice region, the ice design thickness in light ice region is less than or equal to 10mm, in middling ice region is greater than 10mm, besides, less than 20mm, in heavy ice region is greater than or equal to 20mm.

The apply material are:

(1) The observation and analysis report of the project during 2005~2010, including: planning the ice observation data of 4 ice observing stations and 41 ice observing points on the corridor and nearby area during 2005~2010.

(2)Planning the long series of ice observing data of Huangmaoba, Jinfuo Mountain, Xuefeng Mountain which is on the corridor or nearby area.

(3)The survey data of huge ice coating on the path of the corridor area in 1984.

(4)The actual exploratory and survey data of huge ice coating on the path of the corridor area in 2008.

(5)The exploratory and survey data of the ice coating environment on the path of each design and discuss segment.

(6)The special report of ice coating of related line engineering.

The divide method:

Analyze the divide law of ice character and probability distribution in different generalizability ice region. There are 3 geographical zone: the daliang mountain and connected the Sichuan Basin with the south-west, the dalou mountain and connected the wuyuan dividing crest with the west, the east of wuyuan dividing crest and xuefeng mountain.

8 Conclusion

(1) The electric transmission line of Jinping~Sunan

The length of heavy ice region is 237km during the feasibility study stage in 2005. And the length turn to 166km after argumentation because of the power grid ice disaster in the southern region in 2008, the end achievements cut down 60mm, 50mm by a wide margin and cancel the 40mm ice region.

(2)The electric transmission line of Xiangjiaba~Shanghai

The length of heavy ice region is 181km during the feasibility study stage in 2005. And the length turn to 82km after argumentation because of the power grid ice disaster in the southern region in 2008, the end achievements cancel the 50mm, 40mm ice region.

(3) The electric transmission line of Xiluodu~Zhejiang (Xiluodu~Jishou stage)

The length of heavy ice region is 183km during the feasibility study stage in 2005. And the length turn to 169km after argumentation in 2009, the end achievements avoid the 50mm, 40mm ice region.