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POTENTIAL AND ELECTRIC FIELD CALCULATION OF 330KV ICE-COVERED COMPOSITE INSULATORS USING THE FINITE ELEMENT METHOD

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***Abstract*：** The main objective of this paper is to compare the flashover performance of five ice-covered composite insulators with different profiles by calculating the values of potential and electric field along the composite insulators using the finite element method. Comsol, a very powerful commercial software is used to do the modelling and simulation. The results show that the layout of the big sheds, with or without the big sheds have a obvious effect on the distribution of potential and electric field of the composite insulators covered with ice. The calculation results are also compared with the experimental results carried out in the artificial climate chamber with good concordance.

1 INTRODUCTION

Composite insulators are now widely used in the power system all over the word because of their characters of lighter weight, stronger mechanical strength, fewer transportation and installation costs and better anti-pollution performance. Due to the small gap distance compared with ceramic and glass suspension insulators, composite insulators are easy to be bridged by icicle, which lead to lower flashover performance. It's of great significance to evaluate the performance of composite insulators with different profile.

2 RESULTS AND DISCUSSIION

The conductivity of the air and the silicone rubber are neglected, supposing that all the leakage current flows in the ice in the dry-ice condition, and in the water film in the wet-ice condition.

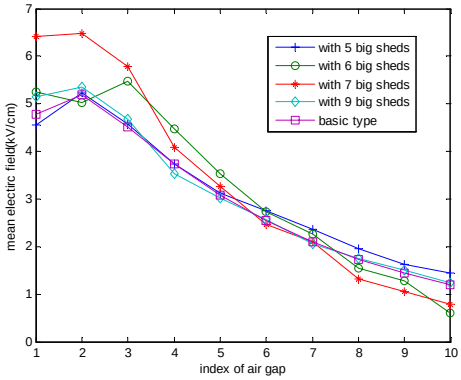

Figure 1: The mean electric field near the high-voltage end of five different of the composite insulators with icicle length of 9.5cm

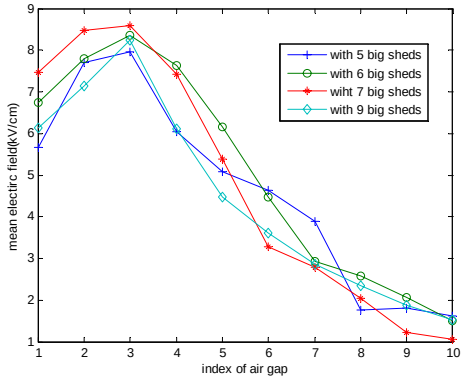

Figure 2: The mean electric field near the high-voltage end of four different of the composite insulators with icicle length of 20.45cm

3 CONCLUSIONS

(1) The distribution of potential and electric field are significant affected by the presence of icicle, especially in the end of icicle. With the growth of icicle, the air gap becomes shorter and shorter, leading to dramatic raise of electric field.

(2) The composite insulator with five big sheds shows a better performance over the others when the icicle length 9.5cm and 20.45cm.

(3) When the composite insulators are totally bridged by the icicles, the potential difference between the end of the icicle and the high voltage end of basic type, five big sheds, six big sheds, seven big sheds and nine big sheds insulators are 68.0%，77.3%, 78.1%, 78.6% and 77.5% respectively of the total potential difference imposed on the insulators. This is due to that the basic type insulator without the big sheds has a big resistance over the other ones when insulators are totally bridged.

4 REFERENCES

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