



### C.8.3.6.

The improved residual-charge measurement to diagnose the water-tree deteriorated power cable

KON H., Fujikura Ltd, Japan

MIYAJIMA K., UCHIDA K., Chubu Electric Co., Japan

WATANABE K., Viscas Corporation, Japan

**Abstract:** The residual-charge measurement is a diagnostic method for water-tree deteriorated power cable. The conventional method uses the amount of residual charge to diagnose the degree of water-tree deterioration, but it depends on the length of cable, because it corresponds to the number of water trees.

In the new method, the information corresponding to the water-tree distribution is obtained, that is, the index corresponding to the longer water tree is obtained. Moreover, it is independent of the length of cable. Therefore, the effective diagnosis under the laid cable can be carried out. Its effectiveness has been confirmed by the on-site tests.

**Keywords:** Power cable, Water tree,  
Residual-charge

### 1.INTRODUCTION

It is well known that the water-tree formation in insulation of cross-linked polyethylene cable affects the dielectric characteristics, that is, its breakdown voltage decreases. To avoid the accident by the breakdown of the cable line in service and to supply the electrical power stably, it has been eager to develop the reliable method to diagnose the degree of the water-tree deterioration of insulation.

**Résumé:** La mesure des charges résiduelles est une méthode de diagnostic de câbles d'énergie détériorés par des arborescences d'eau. La méthode conventionnelle qui considère la quantité de charges résiduelles pour évaluer le degré de détérioration par arborescences d'eau dépend de la longueur du câble car elle correspond au nombre total d'arborescences. Dans la nouvelle méthode présentée, une distribution spatiale des arborescences est obtenue permettant de localiser l'arborescence la plus longue. Cette méthode conduit à un diagnostic sur le terrain indépendant de la longueur du câble. L'efficacité de cette méthode a été confirmée par des essais sur le terrain.

**Mots clés:** câble d'alimentation, water-tree, charge résiduelle

Residual charge method originally developed by Central Research Institute of Electric Power Industry (CRIEPI)<sup>[1]</sup> for 6kV cable. Residual-charges are originated from the accumulated charges on the water tree region under DC voltage application. These are easily released by AC voltage application. The original method diagnoses the degree of the water-tree deterioration by using the amount of residual charges due to all the water-trees.

Fig.1 shows a tendency between the residual charges