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## Research on Intelligent Feedback Partial Discharge Monitoring System of Switchgear Based on Wireless Distributed TEV Sensors

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## Purpose/Aim

Metal enclosed switchgears, which have been widely used, play an important role in power distribution network. However, its frequent faults are becoming an increasingly serious threaten to the grid security. Prior to faults, partial discharge (PD) would happen due to some insulation defects under electrical, thermal, and mechanical stress with the increase in operation time. Thus, PD detection is an effective way to identify potential faults and inspect insulation defects for high-voltage switchgear. Occurring inside a switchgear, PD would emit electromagnetic (EM) wave that propagates and leaks to the outside, and it also excites the surface current on the metal wall of the switchgear. As a result of current and impedance of the material, it would produce a transient earth voltage (TEV) that could be detected by TEV sensor. Therefore, PD monitoring based on the non-intrusive TEV method has the great engineering application value for estimating insulation condition of switchgear.

Experimental/Modeling methods

A wireless distributed on-line monitoring system based on TEV detection method is proposed in this paper. The overall system includes signal preprocessing unit, data acquisition unit, wireless module and terminal analysis platform. Firstly, depend on the distributed TEV sensors on each switchgear, the partial discharge signals are induced, then through the circuits of filter, amplification and demodulation, the analog signal could be obtained by the acquisition unit of 1Ms/s sampling rate. The wireless module is mainly used for the transmission of not only signal data but also control signal between fore-end data collector and back-end control platform. Finally, the signal data is processed and analyzed by terminal analysis platform.

## Results/discussion

The results show that the TEV PD online monitoring system has the characteristics of high reliability, antiinterference ability, less maintenance, etc. In addition, it could assess the PD location and insulation condition effectively to realize fault early warning of switchgears in time, which is of great significance for ensuring the safe operation of switchgears.

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