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Analysis of Reversed Power Flow in an Open Wye-Open Delta Transformer Bank

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Abstract

This paper has explored the inherent characteristics of a distribution transformer with open wye-open delta connection. This connection requiring only two phases on the primary line and providing threephase four-wire service for single-phase loads and threephase loads simultaneously is therefore widely applied in the distribution systems of Taiwan Power Company. There are two single-phase transformers, named lightingleg transformer and power-leg transformer in the bank. Usually the kilovoltampere ratings of these two transformers are different. The asymmetrical structure makes its operational characteristics complicated. Usually, these two single-phase transformers do not share the load kilovoltamperes equally. Moreover, the real power is usually supplied by each of the two single-phase transformers to the loads. However, in some critical conditions, real power may be supplied to the load by only one and part of the real power may feedback to the source from the other. This state is unfavorable and should be avoided. On the basis of a detailed mathematical model of the open wye-open delta bank, this unfavorable situation is investigated in this paper.

Key words: Distribution transformer;Open wye-open delta connection;
Power quality