KTH ROYAL INSTITUTE
OF TECHNOLOGY

Earth-Fault Location in Resonant-Earthed Distribution Networks

Md Zakaria Habib

PhD Student, Dept. of Electromagnetic Engineering

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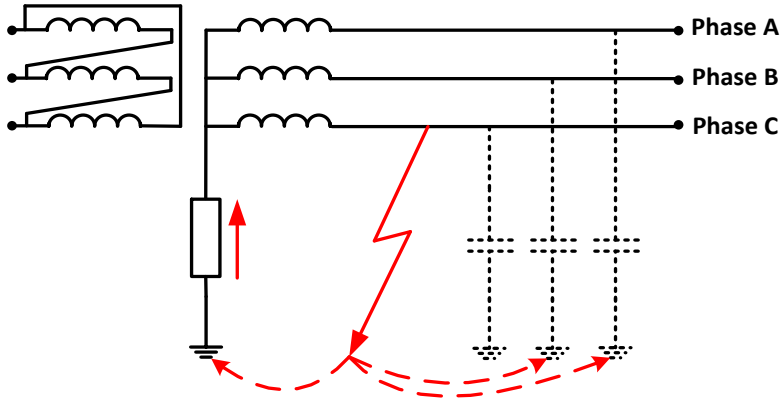
Outline

- Earthing system & earth-faults
- Different earthing systems
- Present Practice and Trend
- Challenges
- Conclusion

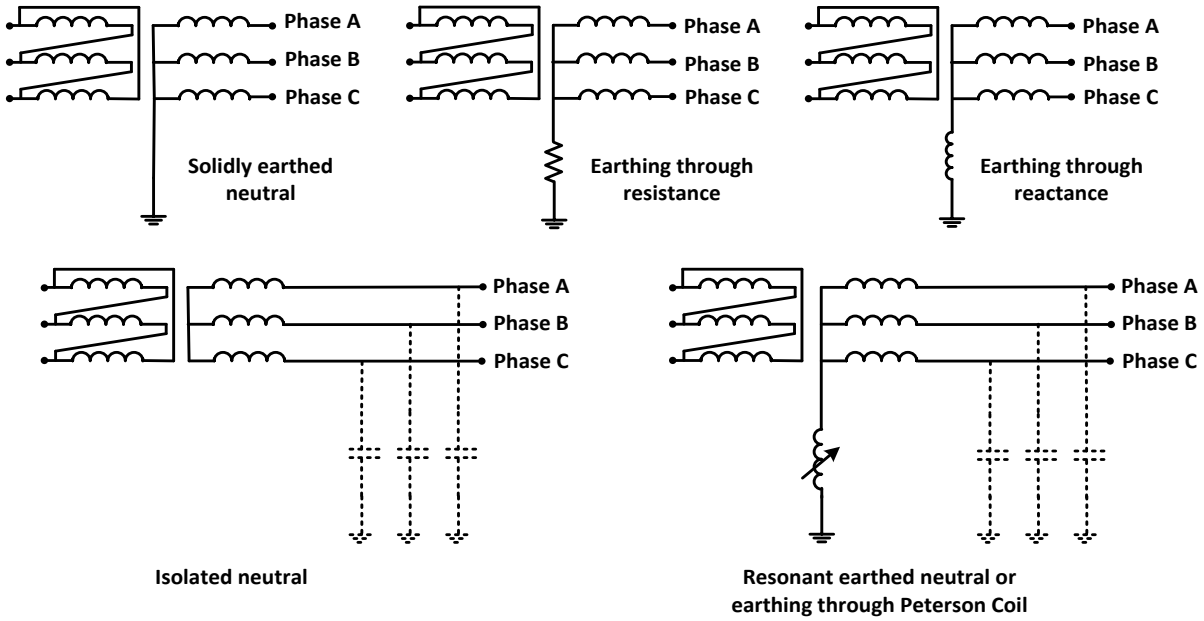
Earthing System and Earth Faults

- Earthing system is defined by the connection method between the transformer neutral and the earth
- It is very important for the fault detection, control of the fault current, overvoltage and operational philosophy of the system



Distribution system with an earth-fault

Different Types of Earthing



Performance criteria	Resonant-earthed	Resistive/Reactive	Solidly earthed
Limitation of overvoltage			
Limitation of fault current			
Continuation of Service			
Protection discrimination			

Legend: Greener is better

Present Practice and Trend

- Patrolling through the faulty feeder is required to determine the fault location accurately
- Use of conventional FPI (Fault Passage Indicator) reduces the down time but still it requires the patrol
- Recently in the DISCERN Project an approach was demonstrated which was a combination of both IED and FPI. The method requires very accurate line data for a precise distance calculation which is not normally available
- Major distribution companies of Sweden and manufacturers e.g. Vattenfall, Ellevio, ABB have shown great interest in improving the accuracy of the fault localization method

Challenges

- Although it is common to have a mismatch between the neutral inductance and the total line-to-earth capacitance, the fault current is still very small which makes the detection of fault location very difficult
- Another important challenge is to improve the accuracy taking advantage of modern sensors and communication system while keeping the solution cost-effective as well as implementable in the practical system

Conclusion

- There are established advanced methods to detect the faults for resonant-earthed network. However, there is still requirement of advanced methods for the fault localization
- Thus, research on improving the accuracy of fault location method for resonant earthed network have a great importance to the network companies as well as manufacturers
- An improved accurate fault localization method will reduce the down time, and thus improve the power quality.

THANK YOU

FOR YOUR ATTENTION!