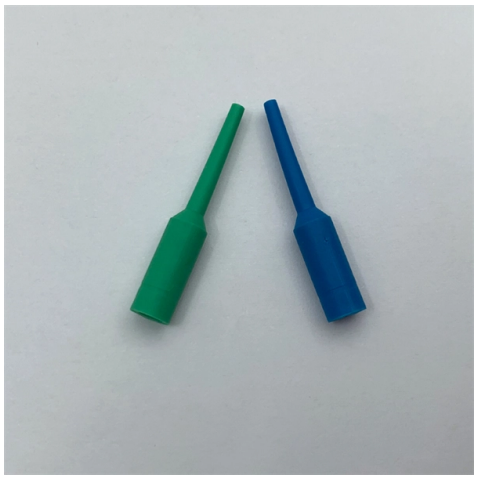
Longitudinal Differential Relay Protection



Overview

Zero-sequence longitudinal differential protection of transmission. This paper explains a new, earth fault-sensitive algorithm for the longitudinal diffe.

Key Takeaways

Longitudinal differential relay protection operates by comparing currents at both ends of a protected line or equipment, tripping the circuit when a difference indicates an internal fault.

Basic Principle

Longitudinal differential protection is based on the comparison of currents entering and leaving a protected zone. The protected zone is defined by the placement of current transformers (CTs) at the extremities of the line, generator, or transformer. Under normal conditions or during external faults, the vector sum of currents entering and leaving the zone is zero, so the differential relay does not operate.

When an internal fault occurs within the zone, the currents at the two ends differ, producing a net current that activates the relay and trips the circuit, isolating the faulted section quickly and selectively.

Components and Operation

Current Transformers (CTs): Two sets of CTs are installed at each end of the protected zone. Their characteristics must match to avoid relay malfunctions. Differential Relay: Measures the difference between the currents.

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If the differential current exceeds a set threshold, the relay operates. Stabilizing Resistor and Percentage Biasing: These are used to prevent false tripping due to CT saturation or minor mismatches. The relay operates only when the differential current exceeds a percentage of the total current, ensuring stability during external faults.

Application in Transmission Lines

For short lines, pilot wires connect CTs at both ends. For longer lines, Optical Protection Ground Wires (OPGWs) are used to transmit signals reliably over long distances, eliminating the limitations of pilot wires. The relay can respond rapidly to faults anywhere within the protected line, ensuring fast disconnection and system stability.

Modern Enhancements

Advanced algorithms monitor current direction and magnitude to improve reliability, especially under CT saturation conditions. Minimum tripping currents are set to ensure sensitivity while avoiding unnecessary trips. Optical communication allows real-time data transmission, enhancing the speed and selectivity of protection.

Summary

Longitudinal differential relay protection is a fast, sensitive, and selective method for protecting transmission lines, generators, and transformers. By comparing currents at both ends of a protected zone and using biasing and stabilization techniques, it ensures that only internal faults trigger tripping, minimizing damage and maintaining system stability.

Article Content

Zero-sequence longitudinal differential protection of transmission ...

This paper explains a new, earth fault-sensitive algorithm for the longitudinal differential protection of transmission lines. The sensitivity of longitudinal differential protection in radial networks

An algorithm for longitudinal differential protection of transmission ...

The longitudinal differential protection principle is based on the comparison of the currents located at the beginning and at the end of the line, resulting in a quick, sensitive and simple

Longitudinal Differential Protection of Power Systems Transmission ...

The longitudinal diferential protection principle is based on the comparison of the currents located at the beginning and at the end of the line, resulting in a quick, sensitive and simple protection concept that

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Differential Protection of Generator or Alternator

Differential protection is primarily used to clear any internal faults in the stator winding of a generator or alternator. The differential protection is provided in the generator by using longitudinal

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The present invention comprises a longitudinal differential protective relay for protection and supervision of power line zones in a distribution system. The protective relays are located at each end of the

(PDF) Longitudinal Differential Protection of Power Systems ...

Power differential relay was proposed recently as a practical relaying scheme for transmission systems. In this paper, the dynamic behaviour of the power differential relay is

Zero-sequence longitudinal differential protection of transmission lines

By establishing communication between the relays on the opposite ends of a line using OPGW, the use of diferential protection becomes a feasible option. The longitudinal diferential protection principle is

Pilot Wire Protection Relay | Transverse Differential Protection

Protective systems requiring the use of pilot wires on transmission lines operate on the principle of differential protection. There are basically two forms of differential protection schemes used for

Longitudinal Differential Protection Algorithm

This document discusses an algorithm for longitudinal differential protection of transmission lines. It begins by describing the classic longitudinal differential protection approach and some of its

An algorithm for longitudinal differential protection of ...

Abstract This paper describes a new algorithm for longitudinal differential protection of transmission lines. Classic stabilization is an unreliable method for avoiding unnecessary relay tripping in case of

Increase of sensitivity of current longitudinal differential protection ...

Current longitudinal differential protection is the main protection of overhead power lines. In the classic version of this protection, the tripping algorithm is based on a comparison of phase currents

Longitudinal Differential Protection of Power Systems ...

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Because of that, relay protection must be fast and safe. Longitudinal differential protection satisfies these requirements. Pilot wire differential relays are commonly used for the protection of short lines. The

A study of algorithms of longitudinal differential protection of ...

A comparative analysis of two principal algorithms of operation of differential protection of generators and transformers is presented. The behavior of relay protection devices based on the

Line differential protection and control RED615 IEC

RED615 is a phase-segregated, two-end, line differential protection and control IED harmonized for overhead line and cable feeders.

Line Differential Relay :

Line Differential Relays are used for protection of transmission lines or cables from all internal faults in the particular zone defined by relays.

Transmission Line Longitudinal Traveling Wave Differential Protection

Traveling wave differential protection is a method used to determine line faults based on the difference between the traveling waves at both ends of the line, and its basic principle is the

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f protective relay. Current diferential relays compare the total currents entering and leaving the prim ry protection zone. They will trip if the diference between these currents exceeds some pre-dei

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