How to set simulation parameters for relay protection in MATLAB

Overview

Protection Relay The Protection Relay block implements a protection relay for the hardware and the motor with definite minimum time (DMT) trip characterist.

Key Takeaways

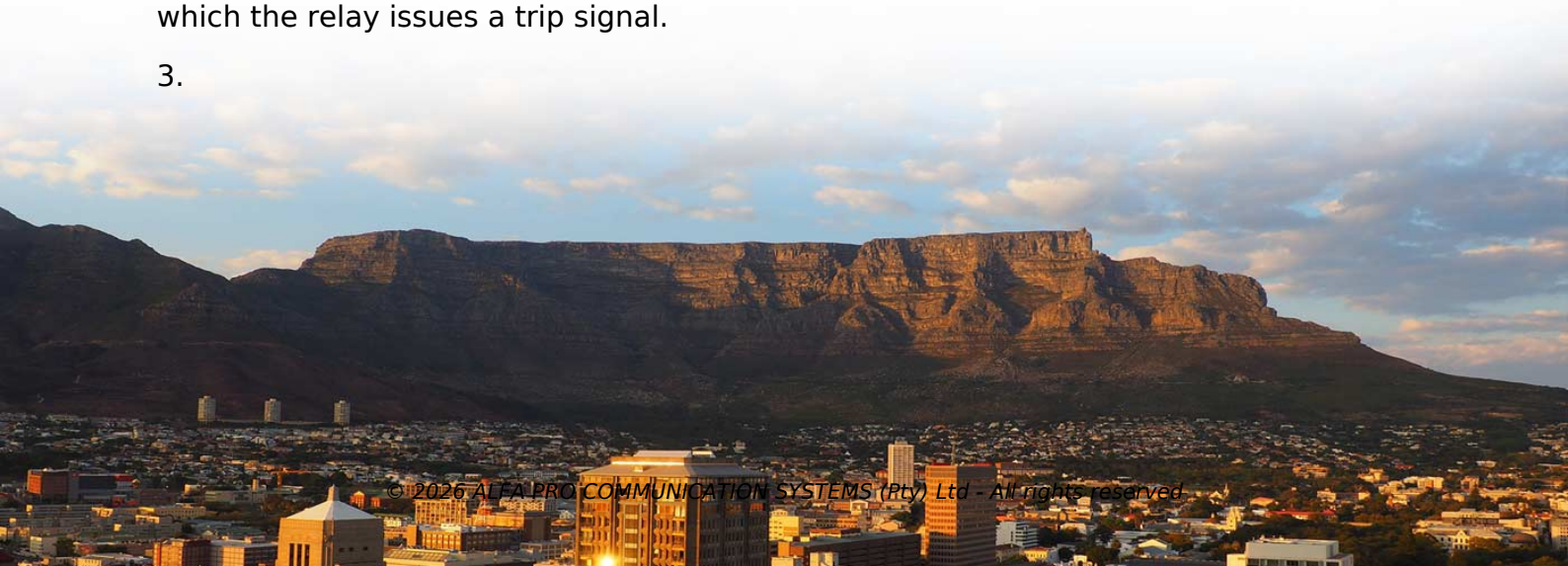
Relay protection parameters in MATLAB/Simulink are set by defining pickup currents, time delays, relay characteristics, and fault scenarios to ensure accurate system protection simulation. Key Steps to Set Simulation Parameters1. Choose the Relay Type Decide whether you are simulating an overcurrent relay, under-voltage relay, or other protective devices.

Overcurrent relays detect excessive current, while under-voltage relays respond to voltage drops. 2.

Define Pickup Values

Pickup current (Ip): The minimum current at which the relay starts operating. For overcurrent relays, this is typically set slightly above the normal load current to avoid false tripping. Voltage threshold: For under-voltage relays, set the voltage level below which the relay issues a trip signal.

3.



© 2026 ALFA PRO COMMUNICATION SYSTEMS (Pty) Ltd - All rights reserved

Set Time Characteristics

Definite Time (DTOC): Specify a fixed operating time for the relay once the pickup current is exceeded. Inverse Time (IDMT): Use standard IEC or IEEE inverse characteristics, where operating time decreases as fault current increases. Parameters include Time Multiplier Setting (TMS) and Plug Setting Multiplier (PSM).

Time grading: If multiple relays are coordinated, set a time delay factor between primary and backup relays to ensure selectivity. 4. Model the Power System Components Include sources, transformers, transmission lines, loads, and circuit breakers in Simulink.

Use current transformers (CTs) to scale currents to the relay operating range. 5.

Implement Relay Logic

Use comparator blocks to detect when current or voltage exceeds the set thresholds. Generate a trip signal to the circuit breaker when conditions are met.

For IDM

T relays, input the characteristic curve as a two-dimensional matrix of current vs. operating time. 6.

Simulate Fault Conditions

Apply single-phase, phase-to-phase, or phase-to-ground faults at different locations in the system. Observe relay response and verify that the correct relay operates first, with backup relays acting after the specified time delay. 7.

Validate and Adjust Parameters

Check that the relay trips correctly under fault conditions and does not operate under normal load. Adjust pickup values, TMS, and time delays to achieve proper coordination and selectivity.

Practical Tips

Use Sim Power Systems toolbox for detailed modeling of relays, lines, and faults. For training or testing, disable certain breakers to observe individual relay operation. Document all parameter settings for reproducibility and comparison with standard IEC/IEEE curves.

By carefully setting pickup currents, time delays, relay characteristics, and fault scenarios, MATLAB/Simulink can accurately simulate relay protection, ensuring reliable and selective operation in power systems.

© 2026 ALFA PRO COMMUNICATION SYSTEMS (Pty) Ltd - All rights reserved

Article Content

Protection Relay

The Protection Relay block implements a protection relay for the hardware and the motor with definite minimum time (DMT) trip characteristics using the reference limit, feedback, and reset input signals.

Relay Protection System using MATLAB Simulink

Over-Current Relay – Detects excessive current in the system and generates a trip signal to the circuit breaker. The project showcases the design, simulation, and validation of relay logic in

(PDF) Design and Analysis of an Over Current Relay Based on

This paper presents an in-depth investigation into the design and performance assessment of an overcurrent relay, utilizing the MATLAB/Simulink simulation environment.

Over Current Relay Modeling in Simulink

Implementation of OC Relay - Free download as PDF File (.pdf), Text File (.txt) or read online for free. The document describes modeling an over current relay in MATLAB Simulink to

Modeling of relay protection of electric power system using Matlab ...

In this article, the authors present new models of protection that allow to simulate the overcurrent relay (51), instantaneous overcurrent relay (50) and differential relay (87) by using

MODELING OF RELAY PROTECTION OF ELECTRIC POWER

The 220 kV km transmission systems are selected as examples for fault simulation and relay testing for each relay model and the coordination protection.

Overcurrent Relay: Theoretical Concepts and Design in Simulink

Use Simulink to simulate the operation of the overcurrent relay model during various fault conditions. Determine the relay''s tripping time, synchronization with other protective devices, &

Distance-Relay-Simulation-for-Power-System-Protection

Distance-Relay-Simulation-for-Power-System-Protection This project simulates an impedance-type distance relay for protecting a 220 kV transmission line using MATLAB/Simulink. The relay detects

© 2026 ALFA PRO COMMUNICATION SYSTEMS (Pty) Ltd - All rights reserved

From Pipelines to Agents: Self-Healing CI/CD Workflow

The promise of DevOps has always been speed through automation. Yet, most of us still spend a significant portion of our time looking through thousands of lines of build logs to find a single

Power system relay protection simulation based on MATLAB

ABSTRACT MATLAB -based simulation technology can support the analysis and design of relay protection systems. A simulation model is built for the study of power system relay protection. As an

Distance Relay Interactive Demo

This basic MATLAB script provides an interactive demonstration of a distance relay, commonly used in power systems for fault detection and isolation. The demo features an R-X

Modeling and simulation of reverse power relay for generator protection

This paper presents the modeling and simulation of digital reverse power relay on MATLAB/Simulink®. Various data conversion steps in digitization of a signal are also discussed.

New SIMULINK Libraries for Modeling Digital Protective Relays and ...

Abstract — This paper presents five SIMULINK li-braries for modeling, design, optimization and testing of digital protective relays. The new MATLAB based software package includes the following

(PDF) Modelling and Simulation of Mho Type Distance Relay for High ...

The simulation results were obtained from MATLAB software shows the feasibility of analysis of transmission line protection with mho type distance relay for single line to ground fault,

How can I simulate a distance relay with matlab simulink ?

Simulation Parameters: Set time step, duration, and relay settings. Signal Sources: Generate current and voltage signals for relay inputs. Visualization: Use Simulink

Distance Relay Protection in AC Microgrid

You can set the direction of the impedance relay based on your requirements. The impedance relay does not trip if the estimated impedance falls in the blinder region. This example also implements a

Modeling Siemens 7UT6 Relay in MATLAB

© 2026 ALFA PRO COMMUNICATION SYSTEMS (Pty) Ltd - All rights reserved

This document describes modeling a Siemens 7UT6 differential protection relay in MATLAB/Simulink. It begins with an abstract and introduction on modeling power systems and protection relays. It then

Over Current Relay Simulation in MATLAB

The document describes modeling an overcurrent relay using MATLAB Simulink to protect a power system. It involves: 1) Creating a Simulink model of a power system with sources, loads, circuit

Related Video Reference

This video was associated with the source search result. Verify technical details against current product documentation and project requirements.

Contact Us

Continue your research online:

Website: https://alfa-pro.co.za
Technical inquiry: https://alfa-pro.co.za/contact.html

This document is for preliminary research. Verify specifications against current standards, product documentation and project requirements.

© 2026 ALFA PRO COMMUNICATION SYSTEMS (Pty) Ltd - All rights reserved