

Simulink for Power System Relay Protection



Article Overview

Simulink can be used to model, simulate, and analyze power system protective relays, including overcurrent, distance, and digital relays, enabling fault detection, relay coordination, and performance evaluation.

Overcurrent Relay Protection

Simulink allows modeling of overcurrent relays with both phase and earth protection units. These relays monitor current levels in distribution lines and send trip signals to circuit breakers when faults occur. You can configure time multiplier settings, operating times, and standard IEC or IEEE characteristics. Backup protection can be implemented by coordinating multiple relays so that only one operates at a time, ensuring selective isolation of faults in microgrids or distribution systems. Current transformers are modeled to step down currents for relay operation, and the relay algorithm calculates operating times based on the selected characteristics.

Distance Relay Simulation

For transmission line protection, Simulink can simulate impedance-type distance relays. These relays detect faults by measuring line impedance and operate in multiple zones (Z1, Z2, Z3) with configurable time delays. Simulations can include phase-to-phase and phase-to-ground faults, relay coordination with backup relays, and integration with circuit breakers. Real-world line parameters, such as line length, voltage levels, and transformer connections, can be incorporated to perform fault a...

Article Content

Oct 11, 2025

OverCurrent Relay (Directional & Non Directional)

Design and Testing of OCR on Power System. File contains the design of a digital over current relay block (Directional

May 24, 2026

(PDF) MODELING OF RELAY PROTECTION OF ELECTRIC

This article presents the modeling of overcurrent and differential relays in MATLAB/Simulink. The overcurrent relay has

Aug 09, 2025

Protection Analysis of an 11-Bus Power System Using MATLAB-Simulink

This paper presents a comprehensive simulation-based study of protection schemes applied to an 11-bus power system using

Sep 24, 2025

Model of a Digital relay.

A Digital Relay is a computer-based system with software-based protection algorithms for the detection of electrical

Apr 05, 2026

Coordination of Directional Over-Current Relays using MATLAB/Simulink ...

These simulation models are developed to support and enhance Power System protection courses at the

Sep 23, 2025

A Novel Approach for Power System Protection Simulation via the IEC ...

This research addresses a significant gap in power system protection methodologies by developing a dedicated

Nov 19, 2025

(PDF) Protection Transformer and Transmission Line in Power System ...

The main challenge in transformer protection is to find a fast and efficient differential relay algorithm that isolates the

Mar 27, 2026

MATLAB-SIMULINK-based simulation for digital differential relay ...

This article presents a MATLAB-SIMULINK-based technology to simulate differential relay for determining behavior of

May 15, 2026

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

May 31, 2026

Overcurrent Relay Protection in AC Microgrid

The Relay block comprises two protection units, phase protection and earth protection. The phase protection unit protects the

Nov 23, 2025

Modeling and simulation of Differential Protection Relay Based on ...

The Siemens 7UT6 differential protection relay is used for power transformer differential protection and is capable of

Jan 01, 2026

Coordination of Directional Over-Current Relays using MATLAB/Simulink ...

This paper describes MATLAB/Simulink implementation of Coordination of Directional Over-Current Relays (DOCR) using 3 bus and

Mar 05, 2026

Modern Approach for Power System Protection Using MATLAB

Itifunctional relays going to be installed in modern power system protection and their methods of protection. Besides this, the thesis

May 29, 2026

fault analysis using overcurrent relay protection in matlab simulink in ...

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Model Based Design for Power Systems Protection Relays, Using Matlab ...

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Feb 27, 2026

Design and Analysis of an Over Current Relay Based on

Ensuring the safety and reliability of electrical power systems heavily relies on the accuracy and performance evaluation of

Jan 03, 2026

Over Current Relay Modeling in Simulink | PDF | Electric Power System ...

Implementation of OC Relay - Free download as PDF File (.pdf), Text File (.txt) or read online for free. The document describes

Oct 23, 2025

Distance Relay Protection in AC Microgrid

This example shows how to model a distance relay in an AC microgrid. The relay block comprises impedance relay characteristic

Nov 15, 2025

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

Dec 06, 2025

Power System Protection Simulations in the SIMULINK

Transformer Protection Transformer Protection 0 of 24 lessons complete Power System

Dec 22, 2025

(PDF) An Innovative Approach For Modeling of Power System Protection ...

This paper describes modelling and testing of a digital distance relay for transmission line protection using

May 01, 2026

Overcurrent Relay: Theoretical Concepts & Design In Simulink

A Tutorial on fundamentals of overcurrent relay, their application in power systems & design of overcurrent relay in

Aug 25, 2025

Design and Analysis of an Over Current Relay Based on MATLAB/Simulink ...

Abstract: The work aims to develop and comprehensively analyze an advanced overcurrent relay system for protecting power

Jun 12, 2026

Relay Protection System using MATLAB Simulink

This project demonstrates the development of protective relay logics using MATLAB Simulink for power system

Sep 17, 2025

Design and Analysis of an Over Current Relay Based on

The work aims to develop and comprehensively analyze an advanced overcurrent relay system for protecting power

May 15, 2026

Modeling of relay protection of electric power system using

In this article, the authors present new models of protection that allow to simulate the overcurrent relay (51),

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