IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 9, May 2025
Impact Factor: 7.67

Identification and Classification of Electrical Faults in Power Transmission using Extreme Learning Machine

Harsha Dnyaneshwar Lande[1] and Joel Leonard Goveia[2]
Department of Electrical Engineering[1,2]
Shri Sant Gajanan Maharaj College of Engineering, Shegaon, India[1]
Fr. Conceicao Rodrigues Institute of Technology, Mumbai, India[2]

Abstract: *Ensuring the reliability and safety of electrical power transmission lines is a major challenge, especially when unexpected faults occur. Quick and accurate identification of these faults is essential to minimize damage, reduce downtime, and maintain system stability. In this work, an intelligent approach using the Extreme Learning Machine (ELM) is proposed for detecting and classifying different types of faults in transmission lines.*

The ELM algorithm, known for its simple structure and fast training speed, is applied to classify fault types based on voltage and current signal data collected under various fault conditions. To improve classification performance, key features are extracted from the waveform data using statistical and signal processing methods. These features help the ELM model effectively distinguish between different fault types such as single line-to-ground, line-to-line, double line-to-ground, and three-phase faults.

Simulation results show that the proposed ELM-based method offers high accuracy and fast response time, making it a promising solution for real-time fault monitoring in modern power systems. The outcomes also highlight the model's robustness in handling noisy and distorted signals, proving its practical value in smart grid applications.

Keywords: Fault Detection (FD), Fault Classification (FC), Transmission Line (TL), MATLAB, Extreme Learning Machine (ELM), Receiver Operating Characteristics Curve (ROC), Area Under the Curve (AUC), Single-Layer Feedforward Neural Networks (SLFNs), Artificial Neural Network (ANN), Support Vector Machine (SVM)

DOI: 10.48175/IJARSCT-27087