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An Artificial Neural Network Based Digital Differential Protection Scheme for Synchronous Generator Stator Winding Protection

Muhammad Faisal Riaz[1], Fawwad Hassan Jaskani[2,*] and Tehreem Awan[1]

[1]NFC Institute of Engineering and Technology, Multan
[2]The Islamia University of Bahawalpur, Bahawalpur

Abstract

This research depicts another artificial neural network (ANN) based digital differential protection scheme for generator stator winding protection. The scheme incorporates two feedforward neural networks (FNNs). One ANN is utilized for flaw recognition and the other is utilized for inward deficiency grouping. This structure utilizes current examples from the line-side and the unbiased end notwithstanding tests from the field current. Essential and/or second consonant present in the field current during an issue help the ANN, utilized for flaw location, to separate between generator states (typical, outside issue and interior deficiency states). Results demonstrating the performance of the protection scheme are displayed and show that it is quick and solid.

Keywords: ANN, Winding Protection, Neural Networks.

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*Corresponding author. Email:Favadhassanjaskani@gmail.com

1. Introduction

1.1. Overview

Transformer and generator are the most fundamental components of the power framework with their protection significance. Since most recent three decades, analysts have been dealing with this specific point and rose to numerous new strategies however generally focused on person protection framework. There are assortments of defensive transfers to give solid and secure transformer protection, of which the differential transfers are observed to be more viable [1] in blame segregation than the old harmonic restraint techniques. The differential transfers ought to be planned in a manner that it doesn't mal-work amid polarizing inrush and over excitation states of transformer. The inrush flows produced after blame leeway are additionally to be considered, as in [2], while structuring the hand-off. The greater part of the techniques pursue a deterministic methodology, depending on fixed limit.

1.2. Artificial Neural Networks

The ANN-based algorithms have been effectively actualized in many example or mark acknowledgment issues, as they can distinguish solid states of generator and transformer based on perceiving their wave shapes, all the more decisively, by separating them from the blame current wave shapes [3]-[5]. In [6], Neural Network Principle Component Analysis alongside Outspread Basis Function Neural Networks is utilized as example classifier. At the end of the day, this procedure makes the choice based on the present mark check which is more exact than customary harmonic restraint based techniques utilized for the protection of transformer. This system could deliver the stumbling signal in the occasion of inward blame inside 15ms after blame event. Optimal Probabilistic Neural Network (PNN) utilized in [7] as the center classifier to segregate among inrush and inside blame. Molecule Swarm Optimization is utilized to acquire optimal smoothing factor for PNN. PNN requires bigger capacity for model examples and it is progressively troublesome to prepare attributable to numerical troubles.