



Ain shams university  
Faculty of engineering

# **Recognition of Power Quality Events Using Artificial Neural Networks**

BY

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## **Statement**

This thesis is submitted to Ain Shams University in partial fulfillment of the requirement for the M.SC. Degree in Electrical Engineering. The included work in this thesis has been carried out by the author at Electric Power and machines department, Ain Shams University. No part of thesis has been submitted for a degree or a qualification at other university or institute.

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# **ABSTRACT**

## **Abstract**

Power quality is a term which includes all what is ideally required by a customer to operate his equipment whatever industrial, agricultural or even domestic, in high and proper order. In fact all modern electrical utilities take power quality consideration very serious. Even some penalties are applied to both sides; customers and utilities, who may destroy or even disturb power quality. This thesis presents three stages of a research work concerned with power quality issues in electric power distribution networks. The first one the power quality research works on the distribution system of the residential city. The Energy Technology Assistance Program (ETAP) is used in modeling the distribution system for symmetrical components and simulating the processes of overvoltage and undervoltage caused by system faults changes in loads and switching of capacitor banks. The simulation results are analysed and compared with relevant standards for evaluating the quality of power in the distribution system. The second stage is used the Power Systems CAD Program (PSCAD) in modeling the distribution system with unsymmetrical components and simulating the process of voltage unbalance caused by system abnormal conditions changes in loads. The third stage is the recognition of power quality disturbances using neural networks. The simulation results work as learning data to neural networks to detect and classify different power quality signal types efficiently. Various steady state events are tested, such as overvoltage and undervoltage and voltage unbalance. Recognition of power quality events by analyzing the voltage waveform disturbances is a very important task in the power system monitoring.

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