



Classification of Power Quality Using Fuzzy Cluster Analysis

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ABSTRACT

Power Quality (PQ) has now become an important concern for utility, facility, and consulting engineers in recent years. Power quality assessment is a complex subject and may include diverse aspects such as power system and equipment modeling, PQ problem mitigation and optimization, and data analysis. This paper presents a classification of power quality using Fuzzy Cluster Analysis (FCA) at Tenaga National Berhad (TNB) substations. The fuzzy c-means (FCM) technique is utilized in this work to classify several PQ disturbances event. The types of concerned disturbances include voltage sags, swells, and transients. The RMS phase voltage data used in this work are from actual measurements at the substation.

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CHAPTER 1

INTRODUCTION

1.0 INTRODUCTION

In the new open-access and competitive power market, electricity consumers are in a unique position to demand a higher quality of service [1]-[2]. The utilities or other power providers have to ensure a high quality of their service to remain competitive and retain/attract the customers. Efficient power quality (PQ) monitoring and analysis system can help to achieve this goal. PQ monitoring can usually be a complex task involving hardware instrumentation and software packages [3]. The instrumentation entails communication software to accomplish the expected functionality. Various types of intelligent electronic devices can be used for collecting the desired PQ data. Examples include dedicated digital fault recorders and protective relays.

After PQ data of interest are obtained, a comprehensive PQ assessment can be carried out depending on the purpose of the study. This may include power system and equipment modeling verification, PQ problem mitigation and optimization, and data analysis. In most cases, automated PQ assessment is desirable because manual analysis may be difficult to carry out due to lack of time and special expertise. Specialized software tools can make use of intelligent techniques to automate the PQ assessment for improved accuracy and efficiency. This paper is focusing on classification of PQ disturbances that may facilitate the overall PQ assessment. When carrying out these studies, various assumptions made will be illustrated where appropriate.