DETECTION AND ANALYSIS OF POWER QUALITY DISTURBANCES USING BILINEAR TIME-FREQUENCY DISTRIBUTION

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ABSTRACT

Power Quality (PQ) is the most prolific and major concern in power industry especially for the power engineers, respectively. Maintaining the power quality at high level is always the aim for the power engineers so that the power delivered efficiently with lesser power loss. Voltage, current or frequency deviation manifesting in the power quality problem would result in failure or permanent disoperation of apparatus and load equipments. Time Frequency Distribution (TFD) is a powerful tool that have attract interest of many power engineering researchers to be tested for recognition and detection of power quality (PQ) disturbances with power related analysis. The development of TFD has been progressively studied under Digital Signal Processing field and it have been used to analyze various real-life problems such as radar, sonar, seismic data analysis, biomedical engineering, and automatic emission . The method used in this study is Wigner Ville Distribution. This method would introduce power quality distortion signal representation in term of bilinear Time-Frequency Representation (TFR). Representation of analysis in classical time or frequency only is not sufficient to show further characteristic and information carried by the signal. Therefore by combining both time and frequency the analysis could be extended to further level such as energy density. BTFD also could capture an identical representation pattern for certain power quality disturbances such as voltage sag, harmonics, and voltage swell in Time-frequency representation. This proposed BTFD's Time-Frequency Representation has a better insight and time resolution compared to the time domain representation or frequency domain representation. This project will focused on Power Quality Distortion signal samples generated using MATLAB and the analysis will also be done by using MATLAB coding. The results will be TFR in 2 Dimensional and 3 Dimensional. The TFR will be a useful reference on the characterization of PQ Disturbances based on its variation types. The PQ Disturbances to be tested are voltage variable and waveform variable.

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CHAPTER I

INTRODUCTION

1.0   BACKGROUND OF STUDY

In this study Wigner Ville Distribution was used as the method for Power Quality (PQ) distortion detection, recognition, analysis and measurement. Wigner Ville Distribution is one of the Bilinear Time-Frequency Distribution which has been popular in Digital Signal Processing for plotting of energy density in time versus frequency. This method cover the drawbacks of both classical time domain and frequency domain, and discovers further information carried by the signal for example the energy density. The plotting of TFD resulting in the new representation called as Time-Frequency Representation (TFR). The TFR can be in 2D or 3D which also called as waterfall plotting. 2D plotting is necessary for measuring the parameters