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POWER QUALITY AND CUSTOM POWER

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"Electric Power Quality" is a term which has captured increasing attention in power engineering in recent years. The term refers to maintaining the near sinusoidal bus voltages at rated magnitude and rated frequency at customers point of connection. The recent concern about purity of waveform is mainly because of sensitive loads such as, microelectronics control equipments; from home VCRs and digital clocks to automated industrial assembly lines, hospital diagnostic systems, computers. These new loads are less tolerant of voltage disturbances and waveform anomalies.

The recent research in the area of "Power quality" consist of four main aspects namely; modeling and analysis, measurements, sources that deteriorates the power quality and solutions for the power quality related issues (Custom power devices). In the first stage of the work carried out under this research work is mainly on measurement of power quality indices. These indices are used to represent, quantify and compare the power quality phenomena. The few commonly used indices used to study the voltage and current waveforms, and their comparison to perfect sinusoidal are listed below.

Index	Main applications
Power factor	Revenue metering
Displacement factor	Revenue metering
Total Harmonic distortion	General purpose, Standards
Telephone interference factor	Interferences
Power quality distortion factor	Overall measure about power quality

In this research study a computer program was developed to capture the voltage and current waveforms, to obtain the Fourier spectrum of the wave shape and to obtain the above indices on line. Using this measurement routine the waveshape and the power quality indices were obtained for a few complex loads. The impact of these loads to the distribution network is qualitatively and quantitatively studied.

Future work includes the analysis of the captured data, modeling of the loads together with distribution network using Electromagnetic Transient program such as PSCAD/EMTDC, studying the possible solutions to these problems and implementing such Custom Power devices to improve the power quality.