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Lab view Based Harmonic Analyser

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----------**ABSTRCT**----------
In the present world, poor power quality measures affects the utilities, equipment's, performance of system and operating cost. Due to the harmonics in the analog circuits it may cause disturbances to other equipment's which are connected to the same supply. This paper explains how to find the total harmonic distortion using labview software which is interfaced with the ni-elvis kit. In this paper, a circuit is developed on the ni-elvis kit and interfaced with labview. The harmonic distortion block is taken to analyze the fundamental frequency and distortion.

***KEYWORDS**: NI-ELVIS, THD, LABVIEW.*

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I. INTRODUCTION:

Analog circuits are the circuits which consist of the capacitors, resistors, transistors, etc. Power sources act as non-linear loads, will form a distorted waveform that contains harmonics. These harmonics will cause issues starting from phone transmission interference to degradation of conductors and insulation in motors and transformers. thus it's necessary to measure the full impact of those harmonics.

By using computers in the power systems has paved way for More research in the field of power system technology [1]. The main disadvantage is that due to the presence of harmonics in the power systems in the supply voltage and load current.

These harmonics can be generated by neither the source nor the load side. With the use of virtual instrumentation, system can built the computers and cost effective hardware [2]. In this project, visual interface offered by the labview has been adopted for simplified design implementation.[1] In this project we determine the Total Harmonic Distortion of only analog circuits. The distortions within the circuit at any node can be know by using Labview software.

II. METHODOLGY:

In the previous measures, many of them have explore the output of a simplified model of an amplifier that has noise coupled to the input signal and exhibits non-linearity using matlab software. we are going to explore attenuation at the input will cut back harmonic distortion. We will conjointly provide an example of a way to mathematically correct for the distortion at the output of the amplifier.

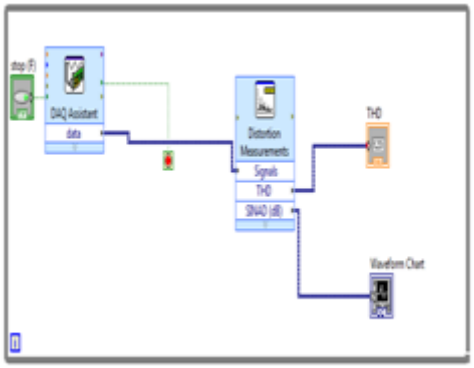
Harmonic analysis and its effects:

In several circumstances, such as, distortion in mains provide lines because of nonlinear hundreds, distortion in FM transmission because of high frequency aspect bands, interpretation of absorption in spectrometry because of radiation (EMR), it's necessary to live the harmonic elements to estimate their result. The harmonics area unit the unwanted contents of the signal in these circumstances. Harmonics cause (i) heating (ii) Premature failure (iii) Reduction in Power Quality of associated Electrical System.[7] Normally, the analysis is disbursed by in industrial areas[3] victimization Spectrum Analyzers[4], digital storage oscilloscopes [5] and there area unit some pc primarily based measurements [6] conjointly which might show the aspect banded spectrum in a very selectable region of research. currently a day's even artificial neural networks unit of measurement used for the estimation and analysis [8]. With facilitate of assorted windowing techniques, a selected region is chosen for analysis.

A harmonic may be a signal or wave whose frequency is associate degree integral multiple of the frequency of some reference signal or wave. Total harmonic distortion (THD) is employed to characterize the one-dimensionality of the audio systems and also the power quality of electrical power systems.“The phrase ‘power quality’ has been wide used throughout the last decade and includes all aspects of events within the system.

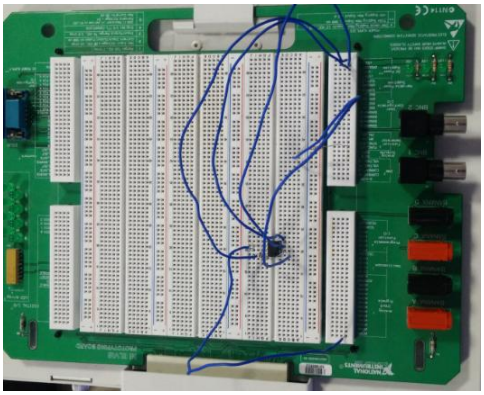
The top result's a share examination the harmonic elements to the elemental element of a symbol. “harmonic distortion and the noise in the circuit isn't truly because of the operation of the facility system. At concerning presently, a singular kind of client load with electronic power provides became fashionable” [9].Harmonic distortion will have prejudicial effects on electrical instrumentation. Unwanted distortion will increase this in power systems which end in higher temperatures in neutral conductors and distribution transformers. Higher frequency harmonics cause extra core loss in motors which ends in excessive heating of the motor core. These higher order harmonics could interfere with communication transmission lines since they oscillate at constant frequencies as a result of the transmit frequency.[10] If left ungoverned, increased temperatures and interference can greatly shorten the life of apparatus and cause injury to power systems.

The labview consist of the many blocks. The DAQ assistance block we used will read the circuit given on the NIELVIS kit. The sampling rate and the number of samples are given then by clicking OK the loop is created and the another block the distortion measurement block is taken which will measure the total harmonic distortion. The output of the DAQ assist is given to the signal input terminal of the distortion measurement block. The output at the THD terminal of the distortion block is given to the number system block that gives the THD of the analog signal and the wave chart is created in the graph panel and a graph block generated in the block panel is connected ti the distortion & measurement block. The output is obtained by running the system in the graph panel.



Fig(1) VI of analog circuit

We have designed a inverting amplifier circuit in prototyping board in NI ELVIS kit. using the interfacing cable the analog output of the circuit can be assist through the labview software.



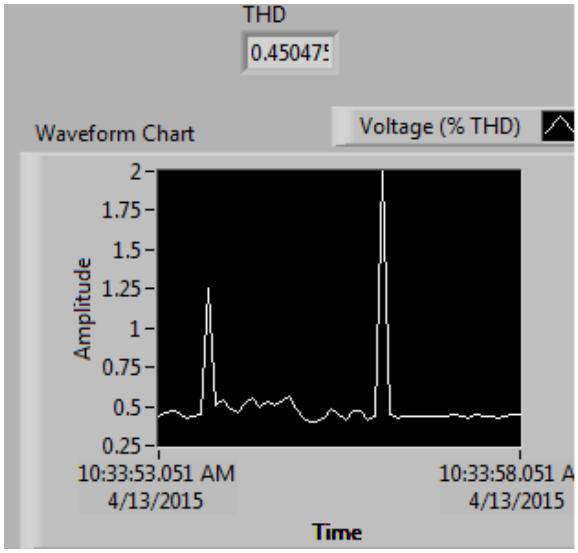
Fig(2) prototyping board

By giving input in the nielvis kit, through labview software it finds the elemental frequency and its harmonics, and computes Total Harmonic Distortion (THD).We can manually control the number of harmonics used to compute THD and by including or excluding frequencies that may have aliased (ideal-like square waves have high frequency harmonics that appear to have aliased to lower frequencies). Any particular test frequency, we can specify it using the advanced search criteria of approximate fundamental frequency and percent search.

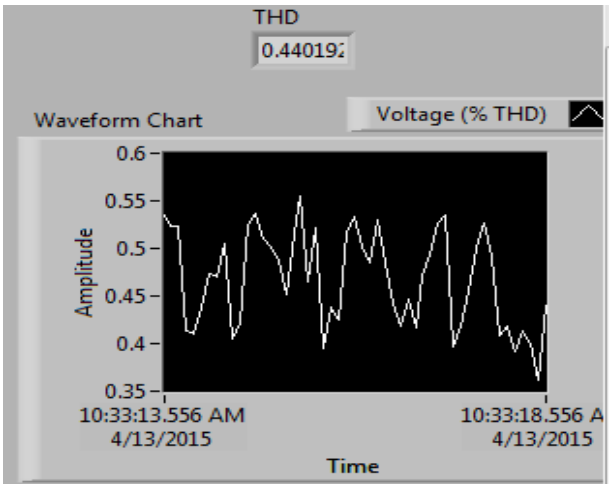
Input frequency	Total Harmonic Distortion(THD)
50Hz	0.45
500Hz	0.44
5kHz	0.43

III. RESULT:

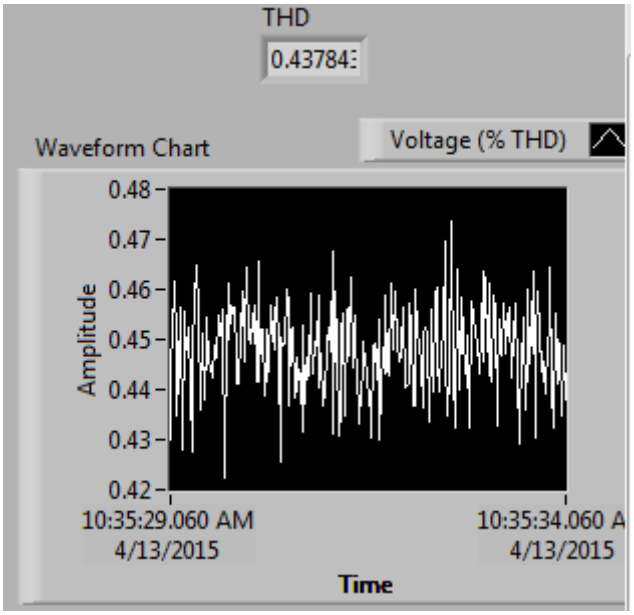
The output of the inverting amplifier circuit is observed in the figure below with the total harmonic distortion and the wave chart of the inverting amplifier. The chart shows the distortion in the circuit with the peeks in it when the simulation is run. In the circuit that we built above the total harmonic distortion is found to be 0.0271. For any analog circuit if the harmonic distortion is less than the 5% then the circuit is considered to be a good circuit.



Fig(a) represents THD of circuit with **50hz**



Fig(b) represents THD of circuit with **500hz**



Fig(c) represents THD of circuit with **5khz**

Fig(a) represents the time vs amplitude for the frequency **50Hz** and the total harmonic distortion is found to be 0.450.Fig(b) represents the time vs amplitude for the frequency **500Hz** and the total harmonic distortion is found to be 0.440.Fig(c) represents the time vs amplitude for the frequency **5kHz** and the total harmonic distortion is found to be 0.437.

IV. FUTURE SCOPE:

The project can be further improved by adding the filters to **reduce** the **harmonic distortion**. The circuits for the filter should be built in parallel with the analog circuit and proceed for the simulation with the builted circuit blocks in labview. Because of this the harmonic distortion can be reduced and made noise free circuit.

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