

Laboratory Experiment 7

Power Quality

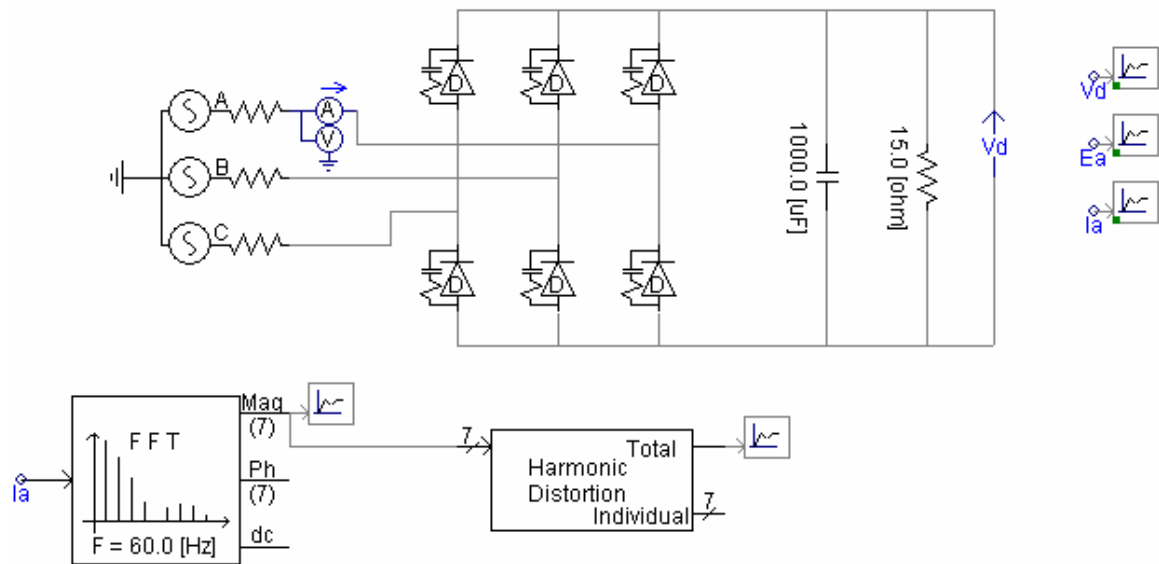
Objectives: To obtain the current harmonics drawn by power electronics interface.

Laboratory Tasks and Report:

1. Calculate the displacement power factor, power factor and the total harmonic distortion associated with the power-electronics interface described in the *PSCAD/EMTDC* file **PowerQuality.psc**. See video clip# 10.

Help with PowerQuality.psc

Build the circuit as shown below



FFT and harmonic distortion blocks are taken from CSMF library.

Voltage and currents are plotted as described in first few experiments.

The class textbook goes into how to calculate THD in Chapter 8. The important thing to remember is that THD is the ratio of the sum of all powers at frequencies above the fundamental to the power supplied at the fundamental frequency:

$$THD = \frac{\sum \text{harmonic frequency powers}}{\text{fundamental frequency power}} = \frac{P_2 + P_3 + \dots + P_n}{P_1}$$

The displacement power factor, DPF is the cosine of the angle between the fundamental voltage and the current at the fundamental frequency. When the THD approaches zero the DPF approaches the usual power factor which is the cosine of the angle between the voltage and the net current.