

One-day Engineering Course

The state of the art of distribution system harmonic analysis

Any engineer who has to resolve power quality issues will undoubtedly be faced at some point to problems related to harmonics, and will need to conduct a specialized investigation to find a cost-effective solution. Simulation of the distribution system with field measurements is usually the first step in the analysis. The solution can be engineered and tested through simulations. This workshop includes case studies and examples.

The workshop will discuss the latest advances in this science, deconstruct common misconceptions and propose methods for harmonic field investigations, including high-frequency disturbances produced by LV DER installation.

Schedule highlights

Learn more about harmonic coordination rules to use for cost-effective solutions:

- Signal processing easily implemented in Excel (Fourier transform - a simple trigonometric problem, filter in time and in frequency domain)
- IEC 61000-4-7© and IEEE 519© requirements for harmonic and angle assessment in the context of analyses
- Harmonic source models of different loads required for simulation
- Cancellation factors to improve the power quality
- Efficiently use the CYMDIST software for investigating harmonic problems
- Impact of small loads
- Power quality issues in low voltage Distributed Energy Resources (DER) installations
- Disturbance emission and immunity of dispersed generation systems in LV networks
- Disturbances at higher frequency levels up to 150 kHz
- Impedance measurement up to 150 kHz with very low-cost equipment
- Voltage unbalance and flicker (impact, simple assessment methods)

Key benefits

- Enhance power system design and effective investigation to reduce and maintain harmonic distortion at a reasonable level
- Understand the measurement requirements needed for conducting field investigations
- Learn about the future challenge for distortion up to 150 kHz affecting various equipment

Who should attend?

Engineers involved in the design and operation of distribution power systems.

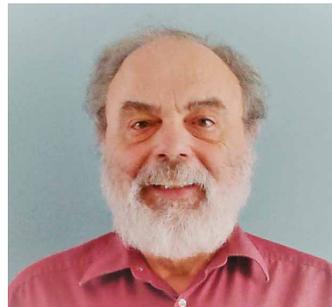
The workshop can be more beneficial with basic knowledge of trigonometry.

The instructor

Mr. Roger Bergeron is an electrical engineer who started his career in 1974 studying 600-V and 13.2-kV industrial power distribution systems. From 1982 to 2005, he was a researcher for IREQ where he led many research programs involving worker safety, power quality and power system design.

He developed his own PQ meter in 2005, which was used for the North-American Harmonic Survey between 2011 and 2016. He also developed the PQ meter used by IEC/SC77A/WG1 to test new measurement methods before being standardized. From 2009 to 2012, he joined CYME for consulting projects. In 2010, he started the CEATI 5142 research project followed by the CEATI 5174 project regarding the impact of harmonic distortion in North America.

Today, he is developing a new PQ meter to continuously measure the disturbance up to 150 kHz according to the CISPR 16 and IEC61000-2-2 standards. He is also contributing in drafting the IEC EMC standards as a member of IEC/SC77A/WG1, IEC/SC77A/WG9, IEC/SC77A/PT61000-3-18. He is also the chairman of the CSA C577.4 on low-frequency EMC as well as the Canadian SC77A national committee on Low-Frequency EMC (below 9 kHz).



The state of the art distribution system harmonic analysis

Registration information

Date: June 11, 2018

Course Language: English

Location:

Delta Montreal
475 Avenue President Kennedy
Montreal (Quebec)
Canada H3A 1J7

Pricing Info and Registration:

my.cyme.com/UsersGroup

Further Information:

CymeInfo@Eaton.com

Presentation outline

1	Introduction and course description
2	Review of fundamental principles (Fourier transform, filtering method, examples in Excel).
3	Low-cost meter for harmonic and impedance measurements.
4	Load models for simulation, including 3-phase equipment models and LV DER model.
5	International standards and simulations tools, with case studies.
6	Immunity and emission of DERs installed on LV networks.
7	Review of the symmetrical component method, with case study.
8	High-frequency compatibility levels of distortions up to 150 kHz.
9	Impact of equipment producing high frequency up to 150 kHz and measurement method.
10	Other disturbances such as flicker and unbalances, measurements, impact and simple assessment methods.

Agenda

Monday June 11, 2018 - Delta Montreal, Room Opus 2

7:30 am - 8:30 am	Registration - Room Opus 2 - Full breakfast buffet - Room Aroma
8:30 am - 8:40 am	Opening remarks and introduction
8:40 am - 10:30 am	Workshop
10:30 am - 10:45 am	Refreshment break
10:45 am - 12:00 pm	Workshop
12:00 pm - 1:30 pm	Lunch - Room Aroma
1:30 pm - 3:00 pm	Workshop
3:00 pm - 3:15 pm	Refreshment break
3:15 pm - 5:00 pm	Workshop
5:00 pm - 5:30 pm	Comments and questions

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