RICHMOND CHAPTER OF IEEE PES

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Power Quality of Power Grids

Date: **Thursday, December 5th, 2019**

Place: **Dominion Energy Auditorium, 2501 Grayland Ave, Richmond, VA 23220**

Schedule:

- **Registration:** **8:30 am - 9:00 am (Coffee & Donuts)**
- **Program:** **9:00 am - 12:20 am with coffee break**
- **Lunch:** **12:20 am –1:30 pm (provided)**
- **Program:** **1:30 pm - 3:00 pm**

Topic:

Good power quality is essential for the proper usage of electricity of modern appliances. With the addition of more and more nonlinear loads and power electronic converters to the grid (such as PV, solar and wind) maintaining good power quality becomes increasingly more challenging. Power Quality problems are a major cause of unscheduled downtime, equipment malfunction, and damage. Today Industrial facilities, data centers, and even office buildings demand to be supplied at a high level of quality power. When power quality is affected due to disturbances like interruptions, voltage dips or harmonic pollution, your business can suffer.

In this seminar, the experts from academia and industry are invited to present various topics on power quality, such as the fundamental theory, industry and consulting experience, and monitoring devices. This seminar will help attendees get a better understanding of power quality issues and their mitigation techniques in power grids.

Seminar Outline:

8:30 am to 9:00 am	Registration
9:00 am to 9:10 am	Opening Remarks
9:10 am to 10:40 am	Power System Harmonics: Root Causes, Analyses, and Solutions
10:40 am to 11:00 am	Break
11:00 am to 12:20 am	Case Histories of Power Quality Problems
12:20 am to 1:30 pm	Lunch (provided)
1:30 pm to 2:50 pm	Power Quality Standards and Monitoring
2:50 pm to 3:00 pm	Chapter Announcements

Instructors:

- Surya Santoso, The University of Texas at Austin
- David Mueller, EnerNex
- Chris Mullins, Power Monitors, Inc.

Seminar Cost:

$50.00 / $25 for student (includes lunch and breaks)

IEEE membership is not required to attend this seminar.

Payment can be made via **Cash or Check at the Door**.

Checks should be made Payable to **IEEE PES.** Advanced Payment is not Required but Registration is.

Reservations: ****NEW ONLINE REGISTRATION ****

Click the Register Button at following Link: https://events.vtools.ieee.org/m/210775

Please Complete Your Registration Online by DECEMBER 2nd

If you are unable to register online or experience problems, please contact PESRichmond@ieee.org or call an officer listed in the header to sign up.

PDHs: 5 professional development hours (PDHs) will be issued for completing this course.

Directions & Parking – 2501 Grayland Ave, Richmond, VA 23220

From the North - Head South on I-95. Take the I-195 south exit, and then follow the I-195 Downtown Expressway. Take the exit off the Downtown Expressway onto Rosewood Avenue. Turn slight right on Rosewood Ave. Turn right on McCloy St. at the stop sign. Take next right onto Idlewood Ave. At the 2nd traffic light, turn left onto Robinson Street. Take next right onto Grayland Ave. 2501 Grayland is on the right.

From the South - Head North on I-95. Take the I-195 Downtown Expressway Exit. Take the Boulevard exit. Turn right on S. Robinson St. Turn right on Grayland Ave. 2501 Grayland is on the right.

Parking lots available near 2501 Grayland Avenue:

- Corner of Grayland Avenue and Robinson Street
- Grayland Avenue lot (south side of the street)
- South Stafford Avenue lot (east side of the street)
- Street parking on Grayland Avenue

Instructor Bio and abstract:

Surya Santoso is Professor of Electrical and Computer Engineering at the University of Texas at Austin. His research interests include power quality, power systems, and renewable energy integration in transmission and distribution systems. He is co-author of Electrical Power Systems Quality (3rd edition), sole author of Fundamentals of Electric Power Quality, and editor of Handbook of Electric Power Calculations (4th edition) and Standard Handbook for Electrical Engineers (17th edition). He is an IEEE Fellow

Abstract: Power System Harmonics: Root Causes, Analyses, and Solutions (90 mins)
In power systems, voltage harmonic distortions arise from the interactions between harmonic currents and the power system impedance. Harmonic currents may come from a variety of nonlinear loads as well as inverter-based generation sources. Topics covered in this talk include the root causes of harmonic distortions, parallel and series resonance phenomena, practical mitigation approaches, principles of passive filter design, and discussion of emerging harmonic sources, such as those of solar farms.

David Mueller is the Director of Power System Studies with EnerNex, based in Knoxville, Tennessee. Since 1990 he has worked on a wide variety of power system projects to study and solve power quality problems. Dave has worked with companies such as Union Carbide, Exide Batteries, Public Service of New Mexico, Delmarva Power, Georgia Power, Wisconsin Electric Power Company, Con Edison of New York, the Electric Power Research Institute, Intel, General Motors, Honda of America, Motorola, American Airlines, East Midlands Electricity (UK), and the Electricity Supply Board (Ireland) to solve power quality problems. He worked from 1993-1995 in Nottingham, England starting the Power Quality Services group for East Midlands Electricity. At that time he developed the 10-volume set, "Power Quality Training Manuals" for East Midlands Electricity. Dave has also written many technical papers and articles on power quality, and has given over 100 presentations on these topics. He has presented these subjects in over 50 different cities, and has done work in over 25 different states in the U.S. Overseas, he has presented power quality in England, Ireland, Spain, Taiwan, Holland, Columbia, the Czech Republic, Sweden, Bulgaria, Indonesia, Singapore, Israel, and Brazil. Prior to joining EnerNex, Dave was at Electrotek Concepts for 21 years, and before that he was employed for eight years by General Motors. While working at GM Dave won a Corporate Energy Conservation Award. Mr. Mueller is a registered P.E. He received a B.S.E.E. from University of Cincinnati, and a Master of Engineering from the Electric Power Engineering Department at Rensselaer Polytechnic Institute.

Abstract: Case Histories of Power Quality Problems
The presentation will cover interesting and instructive case histories of solving power quality problems. Voltage sags, transients harmonic resonance, and wiring and grounding problems will be among the phenomena covered. Examples will come from utility distribution and transmission, manufacturing, data centers, fossil power plants, solar and wind plants, even a billionaire's cabin and a Super Bowl venue.

Chris Mullins is Executive Vice President at Power Monitors, Inc. in Mt. Crawford, VA. Chris leads a company devoted to leading-edge product development to meet the needs of electric utilities and electricity end-users. His twenty-six years at PMI have given him a deep background in electric power quality, power line communications, and electronic instrumentation design, and his work has resulted in patents in power line communications techniques, power quality instrumentation, and energy monitoring. Chris is an active member of several IEEE standards groups and has authored over 70 whitepapers on many power quality topics. He holds a BS degree in electrical engineering from the University of Virginia.

Abstract: IEEE 519:2014 provides measurement techniques, thresholds, and recommendations regarding harmonic distortion for both utilities and end users of electric power. An overview of IEEE 519 is provided, covering the specific harmonic data required for a compliance report, analysis methods, and simplified techniques in cases of low distortion. The philosophy behind the 519 approach, data file examples, and recommendations for harmonic troubleshooting are also presented.