Gustavo A. Ramos (M'04, SM'14) received the B.S. degree in Electrical Engineering from Universidad Nacional, Manizales, Colombia in 1997, and M.Sc. and Ph.D. in Electrical Engineering from Universidad de Los Andes, Bogotá, Colombia in 1999 and 2008, respectively. He is Associate Professor in the Department of Electrical Engineering at School of Engineering, Universidad de Los Andes, Colombia since 2002, where teaches courses on Power Electronics, Fundamentals of Power Systems, Power Quality, Distribution and Industrial Systems Design. As part of his academic activities, he has been advising 4 PhD students, 20 of M.Sc. and more than 100 undergraduate final projects. He has authored 70 international journal papers in addition to more than 80 conference proceedings. He has participated as author in three book chapters and two books. His current research interest includes software-hardware platform to power systems simulation, advanced distribution automation, power systems relaying, transients in grounding systems, power quality and reliability in critical industrial and commercial power systems.

Professor Ramos has provided on-site courses on power systems infrastructure for data center in Latin America. He has served as a reviewer of several IEEE Transactions and other professional organizations. He has been reviewer in COLCIENCIAS (Colombian Administrative Department of Science, Technology and Innovation) and he is also a member of the national standardization agency of Colombia (Colombian Institute of Technical Standards: ICONTEC) for the power quality sector.

Dr. Ramos was awarded with the Graphical System Design Awards for his participation Creating a Real-Time Simulator for Power Quality Signals by National Instruments in NIWEEK 2012 (Austin, Texas). He was finalist at the 2011 International Future Energy Challenge (IFEC'11) and, he had received two national distinctions on account of his research on grounding techniques for power distribution systems. His project was developed with support of one of the biggest distribution network operator in Colombia (CODENSA), and was awarded as the most innovative for the energy sector (ACCENTURE 2013) and the second prize in ÁMBAR Professional Experience 2013 edition by the Colombian Association of Power Networks Operators (ASOCODIS).

His IEEE activities involve:

- The co-foundation of the Universidad de los Andes SB IAS Chapter as advisor.
- Chair of IAS Colombian Chapter (2015-2016) and (2017-2018)
- Chair of PEPQA 2013, 1015, 2017, 2019 and 2023 (Workshop on Power Electronics and Power Quality Applications), the IAS student led conference in Latin America.
- Member-at-Large for IAS Executive board (2015-2016).

Professor Ramos is a recipient of 2014 IEEE-IAS Outstanding Student Branch Chapter Advisor Award. Two of his students received the second place of IAS Graduate Student Thesis Contest (2012, 2016) and the second place of IAS Myron Zucker Thesis Contest (2017).

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LIST OF TOPICS

1. ADVANCED TOPICS ON POWER QUALITY IN DISTRIBUTION NETWORKS

Power quality describes disturbances in the power system that impact the normal operation of end-user equipment losing productivity and damaging equipment.

Today, there are some special characteristics in distribution networks, distributed generation in medium and low voltage penetration of electric vehicle producing harmonic distortion in the charging state.

In this presentation will be shown the basics of power quality phenomena based on cause-effect analysis:

- Harmonics in power systems. IEEE 3002.8
- impact studies for distributed resource interconnection based on IEEE 1547
- Voltage sags. IEEE 1100
- Electromagnetics Transients. IEEE 110

2. POWER ELECTRONICS AND RENEWABLE ENERGY SOURCES INTEGRATION

The use of renewable energy source (RES) in distribution networks and high penetration of inverter-based resources (IBR) can reduce the power losses, improve the reliability and availability of the power system. The power electronics converters are very important as an interface between the RES, IBR and power system.

This presentation discusses some approaches regarding control strategies providing a virtual synchronous reference from power electronics converters. This approach is called virtual synchronous machine (SVM) and it will be shown some simulations in conventional and real-time hardware in the loop hardware and software platforms.

3. SMART GRIDS AND ADVANCED DISTRIBUTION AUTOMATION

The evolution of power system to a smart grid will unlock unimaginable capabilities to respond to environmental impacts, and energy efficiency goals. Particularly, in electrical Distribution Networks (DN), the advanced distribution automation (ADA) is an important key to modern automatic Energy Management System (EMS).

This presentation describes the main strategies for advanced distribution automation like feeder reconfiguration, Volt/VAr control, adaptive protection, fault detection and isolation, electric vehicle, and their impacts to the end-users. A hardware-software platform for smart grid simulation is presented as a novel methodology to validate the automation strategies.

4. TRENDS IN POWER SYSTEM RELAYING TEST

The importance of protection in power systems is such that it could not operate efficiently without discriminative protections. The system is susceptible to three consequences: (1) tends to cause loss

of synchronism of the generators of the system which can split it. (2) generates a risk of harm to the affected plant. (3) generates a risk of damage to healthy plants under operation.

The aim of this presentation is to introduce real-time hardware-in-the-loop techniques (RT-HIL) to test and study different protection systems on industrial distribution networks. It will be presented a tests procedure for electrical protection configuration in an RT-HIL environment including the concept of virtual relaying.

5. GROUNDING SYSTEM FROM GENERATION TO END-USER

The grounding system is an important element in the safe operation of power systems. Firstly, a grounding system should assure that a person is not exposed to the danger of electric shock. Grounding provides a means to dissipate current to earth without exceeding operational limits of the equipment. Finally, there are special issues related with grounding of DER and IBR in power

This presentation will cover the basics of grounding systems, electrodes systems based on IEEE 80, Means of grounding in the generators, substations and end-user transformers (IEEE C62.42, IEEE 3003.1) and electric grounding conductor and bonding systems based on IEEE C3003.2 and NEC.

6. RELIABILITY AND AVAILABILITY FOR CRITICAL INDUSTRIAL AND COMMERCIAL POWER SYSTEMS

The critical infrastructure (CI) plays an important role in our society. The power system has a high level responsibility to ensure of reliability of CI. There are several methodologies to assess the reliability and availability of power system.

This presentation will cover the fundamentals of quantitative reliability evaluation in power system and how to use it on the planning and designing of critical power system. A case study devoted to data center power system will be presented using IEEE 3006 series. Finally, it will be discussed the cost of reliability and its impact on taking decision on critical infrastructure.