

## Bio



Vinod Khadkikar (S'06-M'09-SM'15) received M. Tech. from the Indian Institute of Technology (IITD), New Delhi, India, in 2002 and Ph.D. in Electrical Engineering from the Ecole de Technologie Supérieure (E.T.S.), Montreal, QC, Canada, in 2008. From December 2008 to March 2010, he was a Postdoctoral Fellow at the University of Western Ontario, London, ON, Canada. From April 2010 to December 2010, he was a visiting faculty at Massachusetts Institute of Technology, Cambridge, MA, USA. Currently he is a Professor in the Electrical Engineering and Computer Science Department at Khalifa University, Abu Dhabi, UAE. His research interests include applications of power electronics in distribution systems and renewable energy resources, grid interconnection issues, power quality enhancement, active power filters and electric vehicles. Dr. Khadkikar is currently an Associate Editor of the IEEE TRANSACTIONS ON INDUSTRIAL ELECTRONICS, IEEE TRANSACTIONS ON INDUSTRY APPLICATIONS and IET POWER ELECTRONICS.

## ***List of the lecture topics***

### ***1) Title: Active, Reactive and Harmonic Power Sharing in Islanded Microgrids***

When a distributed generation (DG) or group of DG units operate as single controllable system, it is generally addressed as a Microgrid. These microgrids can be used to supply power to the main grid or can operate as an islanded grid. In an islanded microgrid, the intermittent nature of DG units (such as, photovoltaic and wind) makes the system highly dynamic. This lecture goes into details of islanded microgrids discussing the operation, control and challenges associated with these systems. Special attention will be given to harmonic and unbalance load sharing. Several recent control approaches to deal with the harmonics power sharing will be discussed in detail.

### ***2) Title: Power Quality Challenges and Emerging Solutions under Smart Grid Paradigm***

Even though the power quality problems, such as reactive and harmonic currents, distortion, and fluctuations in the supply voltage, are not new to power system and power electronics researchers, the ever-changing landscapes in power generation and distribution systems have given rise to additional challenges. The growing interest in the smart grid concepts, vehicle to grid operation, inverter-based large-scale photovoltaic (PV) and wind integration, distributed generators (DGs) as ancillary service provider and so on, is making the power quality aspects more prevalent. This lecture will discuss several key technologies to enhance the power quality within the scope of smart grid.

### ***3) Title: Phase-locked loops (PLL) and Frequency locked-loop (FLL) for Fast System Frequency and Phase Detection***

The first step for synchronization and control of grid-connected converters is the fast and accurate estimation of grid voltage's frequency and phase angle. PLLs and FLLs are widely used for this estimation due to ease of digital implementation and satisfactory response. Almost all PLL/FLL structures consist of phase detector (PD), loop filter (LF), and voltage-controlled oscillator (VCO). The loop filter is the most important part in any PLL implementation since it determines the dynamic performance and steady-state tracking characteristics. In this lecture, recently developed Type-1, Type-2 and Type-3 PLLs/FLLs for single-phase and three-phase systems will be discussed in detail.