

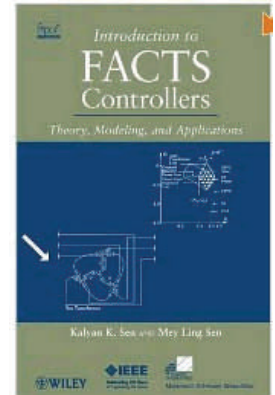


## IEEE London Section PES Chapter FACTS Controllers and Their Modeling Techniques

**Date:** Friday Nov 19th, 2010  
**Time:** 8am—5pm  
**Location:** NRC Research Facilities, 800 Collip Circle, London

**Registration Required:** [london.ieee.ca](http://london.ieee.ca)

<b>Registration Fees:</b>	<b>Early Registration (ends Nov 9th)</b>	<b>Registration</b>
Student with Student ID	\$ 25	\$ 35
IEEE member	\$ 80	\$ 100
Non member	\$ 100	\$ 125



### Introduction

**Maïke Luiken**, Ph.D., Chair, IEEE London Section, Dean, Applied Research & Sustainable Development

### Keynote

## **FACTS Controllers and Their Modelling Techniques**

### Keynote Speaker

**Dr. Kalyan K. Sen**, P.E. - PES Distinguished Lecturer

### Workshop Program

- Introduction
- Voltage-Sourced Converter (VSC)
- Installation of World's First UPFC
- VSC-based technology
- Simulation and field results
- Special applications of VSC-based technology

**Lunch & Beverages will be provided**

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## FACTS Controllers and Their Modelling Techniques

**ABSTRACT:** The power industry's quest for the *most economic way to transfer bulk power along a desired path* can only be achieved through the independent control of active and reactive power flow in a transmission line. Traditional solutions, such as shunt inductor/capacitor, phase-shifting transformer, and series inductor/capacitor affect both the active and the reactive power flow in the transmission line simultaneously. With the use of Voltage-Sourced Converter (VSC)-based Unified Power Flow Controller (UPFC), the active and the reactive power flow in the line can be regulated independently. Since the field demonstration of the world's first UPFC in 1998, another Flexible Alternating Current Transmission Systems (FACTS) controller, namely the Sen Transformer (ST), has been proposed. In contrast to the UPFC, which uses a large number of solid-state switching devices, the ST uses time-tested passive components, such as transformer and mechanical load tap changers, but provides the same independent active and reactive power flow control as the UPFC at a much lower cost and much higher operating efficiency.

The objectives are to give a background on traditional power transmission technology and discuss new techniques that utilize the transmission lines most effectively. The workshop covers various types of FACTS controllers and their usefulness in power system applications. Various modeling techniques of FACTS controllers are discussed. The results from the simulation are compared with those from the field measurements. This presentation is of particular interest to all utility power-engineering professionals. The required background includes an electrical engineering degree and some familiarity with power engineering terminology.

### Keynote Speaker: Kalyan K. Sen

**BIOGRAPHY:** Kalyan K. Sen (S'83 M'87 SM'01) received B.E.E, M.S.E.E, and Ph.D degrees, all in Electrical Engineering, from Jadavpur University, India, Tuskegee University, USA, and Worcester Polytechnic Institute, USA, respectively. He has spent 23 years in academia and industry. He was a key member of the FACTS development team at the Westinghouse Science & Technology Center in Pittsburgh, USA. He contributed in all aspects (conception, simulation, design, and commissioning) of FACTS projects at Westinghouse. Dr. Sen conceived some of the basic concepts in FACTS technology. He has 25 patents and publications in the areas of FACTS and power electronics. He is the coauthor of the book titled, **Introduction to FACTS Controller: Theory, Modeling, and Applications**, New York: IEEE Press and John Wiley & Sons, Inc. 2009. He is the co-inventor of the "Sen" Transformer for FACTS applications. He is also the cofounder of SEN Engineering Solutions, where he pursues his interests in affordable power flow controllers. His interests are in Power Converters, Control, Electrical Machines, and Power System Simulations and Studies. He is a licensed Professional Engineer in the Commonwealth of Pennsylvania.

Dr. Sen, a Senior Member of IEEE, has served the organization in many positions. In 2003, he re-established the Pittsburgh Chapters of the Power & Energy Society and the Industry Applications Society. Both Chapters received the "Outstanding Large Chapter" awards for their activities in 2004. Under his Chairmanship, the Pittsburgh Section received the "Outstanding Large Section" award for its activities in 2005. He served as an Editor of the IEEE Transactions on Power Delivery from 2002 to 2007. He served as the Technical Program Chair of the 2008 Power & Energy Society General Meeting in Pittsburgh, and the Chapters and Sections Activities Track Chair at the 2008 IEEE Sections Congress in Quebec City, Canada. He has been serving as an IEEE Distinguished Lecturer since 2002. He also serves the Power & Energy Society Governing Board as the Region 2 Representative.

