

Ministry of Human Resource Development
Government of India

Discipline of Electrical Engineering
Indian Institute of Technology Indore



5 Day Course on

Grid Integration of PV Solar And Wind Power Systems



February 12 - 16 | 2018



Teaching Faculty



Dr. Rajiv K. Varma

Professor

**Electrical and Computer Engineering Department
The University of Western Ontario**

London, Ontario

CANADA

Dr. Rajiv K. Varma is *Professor* in the Electrical and Computer Engineering Department at The University of Western Ontario. He was the “Hydro One Chair in Power Systems Engineering” established by Hydro One Networks Inc. - the largest transmission and distribution utility in Ontario, Canada, from 2012 to the culmination of the Chair program in 2015. He is the Secretary of IEEE Power and Energy Society “HVDC and FACTS Subcommittee” since 2014. He is also the Chair of “IEEE Working Group on HVDC and FACTS Bibliography”, and is active on several other IEEE Working Groups. He was the Editor of “IEEE Transactions on Power Delivery” for five years. Dr. Varma has presented numerous IEEE Tutorials, Courses and Workshops, on “FACTS” and “HVDC” in different countries. Dr. Rajiv Varma was the Western’s Project Lead in the \$6.125 Million project on “Large-Scale Photovoltaic Solar Power Integration in Transmission and Distribution Networks”, together with University of Waterloo, funded by Ontario Centres of Excellence, Ontario Power Authority, a transmission utility - Hydro One, two local distribution utilities - Bluewater Power Corporation and London Hydro, and a major solar farm developer - First Solar. He subsequently led two multi-university (Western - Waterloo - Ryerson) projects totalling \$2 Million on “Enhancing Grid Connectivity of Renewables through Innovative Controls of PV Solar Farms” and “Smart Management of Short Circuit Currents from Distributed Generators”. These Projects were supported by Ontario Centres of Excellence, Ontario’s System Operator, the above industry partners, Testforce, German Solar and Kaco. Dr. Varma has developed a set of innovative technologies of utilizing PV solar farms in the NIGHTTIME and also daytime during critical system needs for providing multiple benefits to both transmission and distribution systems. These technologies transform a solar farm inverter into a dynamic reactive power compensator- STATCOM, named as PV-STATCOM. Till now six patents have been issued to Dr. Varma’s works, while a few others are pending in different countries.

Course Overview

Different countries are setting up ambitious targets for integration of renewable energy sources to reduce greenhouse gas emissions. Solar and Wind based Distributed Generators (DGs) are therefore being increasingly employed worldwide. This course will involve a comprehensive review of the negative impacts of DG integration and their mitigation techniques. Several case studies of actual utility systems where the adverse impacts of DG integration have been experienced, and the solutions employed to resolve them will be described. This course will also provide a thorough review of the different technologies for increasing the hosting capacity of distribution networks used worldwide for accommodating DGs, with the focus being on solar and wind. Modeling of systems and the studies needed to determine the existing hosting capacity and its enhancements by various methods will be covered. Case studies of actual implementations and the planned usage of these techniques in utility networks will be described. This course will further present the concept of smart inverters, description of various smart inverter functions, and operating experiences of existing smart inverter installations and demonstration projects.

Course Details

1. **Modelling of PV solar and wind power systems**
2. **Adverse impacts of DG integration**
3. **Smart inverter functions and its applications**
4. **Microgrids: Issues, challenges, control & stability**
5. **Control coordination of DGs: Emerging challenges**

Host Faculty



Dr. Trapti Jain
Associate Professor
Discipline of Electrical Engineering
Indian Institute of Technology
Indore
Indore, India

Dr. Trapti Jain received the Ph.D. degree in electrical engineering from the Indian Institute of Technology Kanpur, Kanpur, India. Since 2015, she is also an Independent Director of Madhya Pradesh Paschim Kshetra Vidyut Vitran Company Limited (MPPKVVCL). Her research interests include power system security, artificial intelligence applications to power systems, power system dynamics, microgrid stability and control, power quality, and grid integration of electric vehicles.

Registration Fee*

Professionals from industry / private organizations	Rs. 10,000
Faculty members of educational institutions / research organizations	Rs. 5,000
Students / Research Scholars from educational institutions	Rs. 3,000
Foreign delegates	USD 225

* Inclusive of taxes.

Travel and Accommodation

- Indore is located in central region of India in Madhya Pradesh State. Indore is well connected by Road, Rail, and Air. The nearest railway station is Indore Junction and the nearest Airport is Devi Ahilyabai Holkar Airport. For queries regarding travel information, please contact the course coordinator.
- Participants have to make their own travel arrangements.
- Institute accommodation on sharing basis can be provided on chargeable basis subject to availability.
- For any information regarding eligibility, fee payment, travel information, accommodation, special requests, etc., please contact the course coordinator.

Programme Coordinator

Dr. Trapti Jain

Associate Professor

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Khandwa Road, Simrol
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Course Objectives

- Identify the different challenges of grid integration of Distributed Generators based on PV solar power and wind power systems, and understand the techniques adopted to mitigate these negative impacts
- Comprehend the different technologies for increasing the hosting capacity of distribution networks used worldwide for accommodating DGs, with the focus being on solar and wind.
- Develop the knowledge of various smart inverter functions
- Learn from the emerging challenges and operating experience of utilities in implementing smart inverter technologies.
- Realize the need for further research and development in this rapidly growing area of renewables integration.

Who Can Attend?

- Research scholars, graduate students, undergraduate students, engineers, trainees, and researchers from different organizations/institutions across the country working in the field of power systems or energy engineering.
- Faculty members and academicians interested in research or who wish to update their knowledge in the field of power systems and grid integration of renewable systems.
- Professionals, utility executives, and engineers working in the power industry and other government organizations including R&D laboratories who are engaged in power engineering.
- System planners, grid operators, and manufacturers of PV solar and wind power equipment especially inverter manufacturers

Important Dates

Registration deadline	January 25, 2018
Course schedule	February 12-16, 2018

Course Venue

Indian Institute of Technology Indore
Khandwa Road, Simrol
Indore, Madhya Pradesh, India
PIN: 453552

Contact Information

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