

# Electric Power and Power Electronics Institute

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## WEEKLY SEMINAR SERIES – SPRING 2016

Wednesday, February 17<sup>th</sup>, 2016, 9:00 – 10:00 a.m., Fishbowl (Tele-Seminar)

### MODELING AND ANALYSIS OF GRID CONNECTED VARIABLE SPEED WIND GENERATORS

Seshadri Sravan Kumar  
Indian Institute of Science, Bangalore, India

#### Abstract

The growing demand for power and increased environmental concerns gave an impetus to the growth of clean and renewable energy sources like wind, solar etc. There is a remarkable increase in the penetration of wind energy systems in the last decade and this trend is bound to increase at a much faster pace in future. Present day wind energy systems mostly comprise of variable speed wind generators. A large fraction of present day variable speed wind turbine generators use doubly fed induction machine (DFIM).

This talk will provide an overview of our work on modeling and grid coordination aspects of variable speed wind generators. In the first part of this talk, I will highlight the shortcoming of the existing steady state equivalent circuit of a DFIM. Subsequently, I will discuss an accurate equivalent circuit of a DFIM and present some validation results using dynamic simulations of a standalone DFIM. Following this, I will discuss a framework developed to incorporate DFIM in steady state power flow analysis. The developed framework takes into consideration important aspects such as voltage dependent reactive power limits and mode of reactive power control of associated converters. In the final part, I will discuss a trust region framework to coordinate the reactive power output of variable speed wind generators with other reactive power controllers in the grid.

#### Biography

V. Seshadri Sravan Kumar received the M.Sc. (Engg. Degree) from the Indian Institute of Science, Bangalore, India where he is currently working towards the Ph.D. degree. He has submitted his PhD Thesis in December 2015 and is currently working as a Junior Research Associate at Indian Institute of Science, Bangalore, India. His research interests include Grid connected renewable energy systems, State estimation, Voltage stability, and Wide area monitoring and control of electric power systems.