Design and Modeling of Dual Fed Asynchronous Generators: Application to Wind Power Generation

Abstract:

The design and modeling of dual fed induction generators is considered in this tutorial. The topic will be covered by using examples that are focused primarily for wind power generation applications. The tutorial will begin with an overview of such systems and component identification. The design and modeling methodologies and challenges of various components will be discussed then. This will be followed by discussions on the design of induction generators and their field oriented control strategies. Topics covered will include design strategy for initial design (sizing, material and winding designs), load point analysis, and machine performance etc. Multi-physics aspect (electromagnetic, thermal, and mechanical) of the design algorithms will also be discussed. Aside from generator design, there will also be some general discussions on inverter topology and simulation specific to such devices. Modern computer aided design software will be used to illustrate the various design and simulation strategies related to such systems. As well, a literature review will accompany the presentation to highlight the state-of-the-art of such systems.

Lead Instructor:

Title: **Mr.**
Name: **James Hendershot , Fellow, IEEE.**
Affiliation: **Infolytica Corporation**
Street Address: **300, Leo Pariseau, #2222**
City / State / Zip Code: **Montreal, PQ, H2X 4B3, Canada**
Telephone / FAX: **514 849 8752**
E-Mail Address: **jrhendershot@comcast.net**

Other Instructors:

Dr. Tanvir Rahman
Application Engineer, Infolytica Corporation
Phone: 514 849 8752 ext. 308
e-mail: tanvir@infolytica.com

Instructor Bios:

James R. Hendershot has 40 years experience in practical hands-on PM & SR brushless motor and generator design and also AC induction motor/generator design for inverter operation. This experience includes manufacturing and development of those machines. With past key employments at United Technologies, General Motors, Clifton Precision, Berger Lahr & Pacific Scientific, he has designed hundreds of brushless machines for computer disc drives, servo systems, high speed machine tool spindles, traction drives, hybrid vehicles, micro-turbine and diesel generators as well as AC Induction motors for traction drives. He has written numerous technical papers, publications and presented electrical machine design workshop - tutorials on many different electric motor topics. Hendershot is the co-author of two books with Professor TJE Miller.

His research interests include development of generators and alternators for wind-turbines and EV's with and without the use of permanent magnets and development of ultra-high speed Generators and Alternators for Gas micro-turbines

Jim Hendershot, an IEEE Fellow, holds a B.S in Physics from Baldwin Wallace College in Berea Ohio. He specializes in the design and analysis of both electro-magnetic and permanent magnet devices as well as teaching design courses and workshops.

Dr. Tanvir Rahman is an Application Engineer at Infolytica Corporation where his primary responsibility is the CAD and applications of electromagnetic solvers to electric machines. Most recently he has been involved with applying some of the latest CAD tools for the design and simulations of Brushless DC and Induction motors for wind power and hybrid electric vehicle application.

Dr. Rahman has been professionally involved with the simulation and modelling of electric machines since 2006. He obtained his Ph.D. in Computational Physics from McGill University in 2005 in the area of Astrophysical fluid dynamics. His research interests include multi-physics simulations of electric machines, new design algorithms of switched reluctance machines among many others.