With the rising cost of petroleum, concerns about exhausting the fossil fuels we depend on for energy, and the subsequent impacts that the burning of these types of fuels have on our environment, countries around the world are paying close attention to the development of renewable types of energy. Consequently, researchers have been trying to develop ways to take advantage of different types of clean and renewable energy sources. Wind energy production, in particular, has been growing at an increasingly rapid rate, and will continue to do so in the future. In fact, it has become an integral part in supplying our future energy needs, making further advancements in the field exceedingly critical.

A 2 MW wind energy conversion system (WECS) is presented and has been simulated via the dynamic simulation software Simulink. This WECS consists of a 2 MW permanent magnet synchronous generator connected to the transmission grid through a power conversion scheme. The topology of this converter system consists of a passive AC/DC rectifier as well as a PWM DC/AC IGBT inverter, used to interface the DC link with the grid. The inverter has an integrated current control system for power factor correction to improve output power stability. The described WECS enhances grid-side tolerance by buffering wind power disturbances demonstrated by its capability to isolate the grid from wind speed fluctuations. It also optimizes wind energy capture through harmonic filtering, enhancing output power quality. These findings have the potential to lead to further advancements including the capability for island operation and integration to a smart grid.

Major: Electrical Engineering

Educational Career:
Bachelor’s of Electrical Engineering, BS, 2008, University of Central Florida

Committee in Charge:
Dr. J. Yuan, Chair, Electrical Engineering and Computer Science
Dr. P. Wahid, Electrical Engineering and Computer Science
Dr. M. Haralambous, Electrical Engineering and Computer Science

Approved for distribution by Dr. J. Yuan, Committee Chair, on October 14, 2010.

The public is welcome to attend.