

A Novel Doubly-fed Induction Wind Generator Control Scheme for Reactive Power Control and Torque Pulsation Compensation Under Unbalanced Grid Voltage Conditions

Ted Brekken

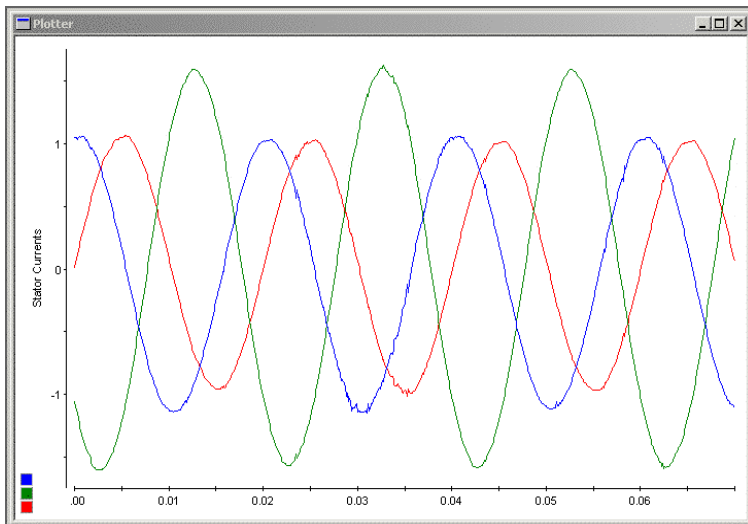
Funded by the National Science Foundation

This project aims to develop a control scheme for a doubly-fed induction wind generator that:

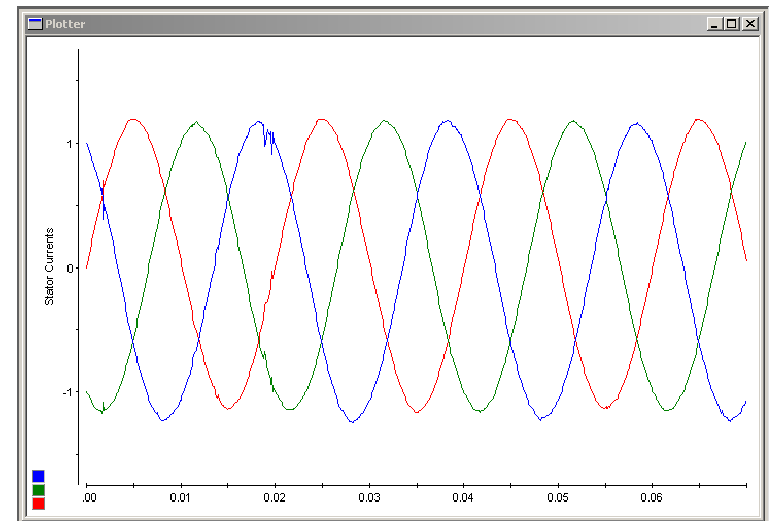
- 1) Offers speed and reactive power control.
- 2) Compensates for torque pulsations, allowing the wind generator to stay connect to an unbalanced grid.
- 3) Draws 3-phase balanced current from the unbalanced grid.

Results

Experimental results on 200 Watt lab setup: injection of negative sequence rotor currents to compensate for stator current unbalance.



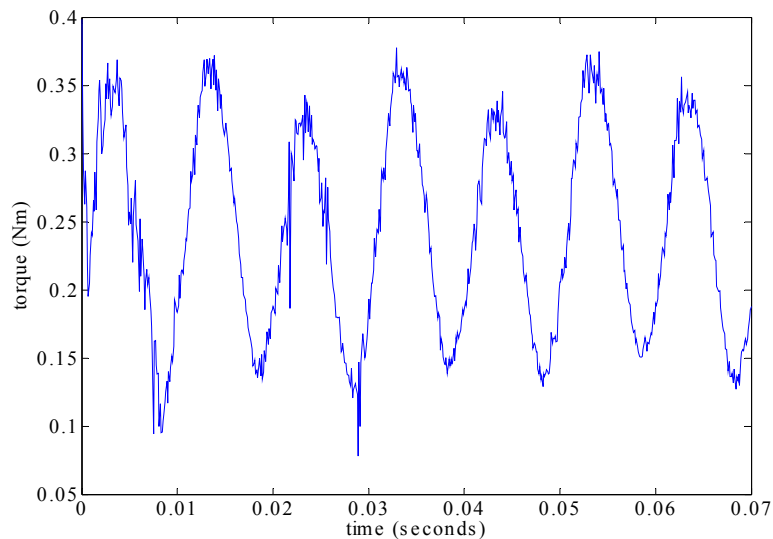
Stator current with 50% stator voltage unbalance, no rotor compensation



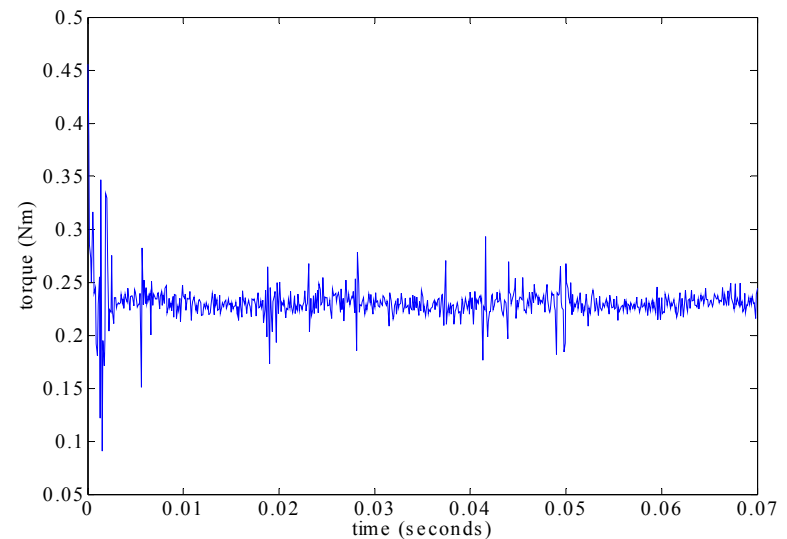
Stator current with 50% stator voltage unbalance, with rotor compensation

Results

Experimental results on 200 Watt lab setup: injection of negative sequence rotor currents to compensate for torque pulsations.



Electromechanical torque with 50% stator voltage unbalance, no rotor compensation



Electromechanical torque with 50% stator voltage unbalance, with rotor compensation

Future Work

- ◆ Controller design of rotor converter for reactive power control and balancing stator currents
- ◆ Investigation of FPGA's for modeling and control
- ◆ Hardware testing

Publications

- ◆ T.Brekken, N.Mohan. "A Novel Doubly-fed Induction Wind Generator Control Scheme for Reactive Power Control and Torque Pulsation Compensation Under Unbalanced Grid Voltage Conditions." Power Electronics Specialists Conference, 2003.