Design and Control of Permanent-Magnet Synchronous Machines for Flywheel-storage

Specialists in permanent magnet (PM) type electric machines and drive systems. Strong capabilities in designing and optimising high-speed PM machine geometries and developing advanced control techniques to further improve performance for emerging applications such as flywheel storage.

More Information

Dr Rukmi Dutta

School of Electrical Engineering and Telecommunications

T: +61 (0) 2 9385 7884
E: rukmi.dutta@unsw.edu.au

UNSW Knowledge Exchange

knowledge.exchange@unsw.edu.au

www.capabilities.unsw.edu.au

+61 (2) 9385 5008

Competitive advantage

- Expertise in PM machine design and control
- Mechanical sensorless control for PM machine
- Expertise in designing very high-speed PM machine drives suitable for applications such as the flywheel storage
- Developing advanced on-line parameter identification techniques

Impact

- Permanent magnet motor-generators of rated speed in excess of 50 krpm
- Advanced control schemes and drivers for smooth energy conversion

Successful applications

- Sensorless control techniques for PM motor drive
- Development of novel interior-type PM motors with speed capability >50,000 rpm

Capabilities and facilities

- Finite-element packages, including Magsoft and ANSYS, with optimization tools developed in-house
- Simulation platforms (Matlab–Simulink, PSIM), FPGA and DSP systems with high-performance signal acquisition, estimation and switch gate-drive interfaces
- Two and three-level inverters
- Several machine drive set-ups complete with shaft position sensors, torque sensors and highly dynamic loads
- Four-quadrant dynamometer for testing direct-drive wind generators
- High-speed (>50 krpm) PM machine test bed

Our partners

- CSIRO
- Wisconsin Electric Machines and Power Electronics
- Toshiba
- Regal Beloit