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.

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

More Information

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