Electric Motors Drives Courseware

OP1120

"This courseware explains thoroughly the concept of variable speed drives for various types of motors, namely, Brushed-DC, permanent magnet synchronous, squirrel-cage induction, and doubly fed induction."

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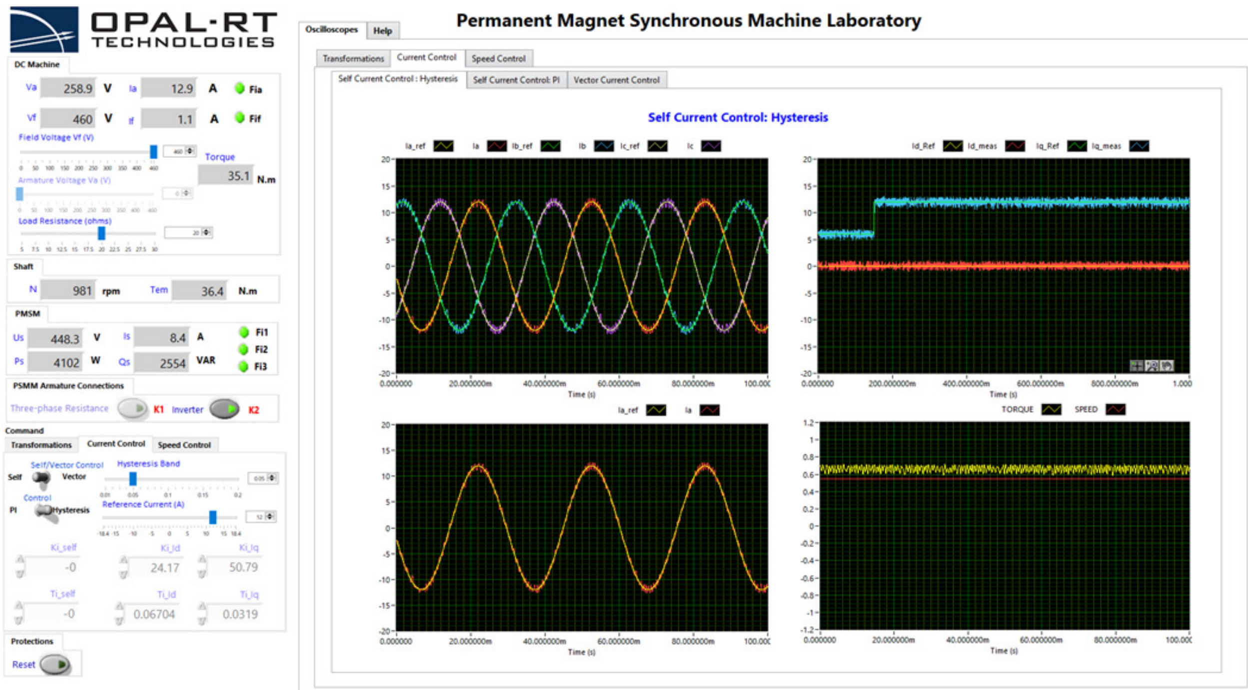
The courseware is intended to teach various control strategies implemented in variable speed drives to universities' under-graduates and colleges' students. Students grasp deep under-standing of concepts such as torque and speed linear control for brushed-DC motors, hysteresis self- and vector-current control for PMSM, indirect FOC for induction motors and vector-control for doubly fed induction motor. Additionally, switches-based converters are employed in the scheme instead of the commonly used averaged models.

MAIN BENEFITS

- An interactive user interface brings students into the loop and allows them to drive motors in open loop first, then close the loop and tune the controllers' parameters.
- Comparison of the performance of various control schemes in real-time and instantaneous observation of the changes in the waveforms due varying mechanical load on the motor shaft.
- Protection is implemented and allows students to reset the experiments, making it possible to recover from mistakes.

INTERACTIVE PANEL



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ELECTRIC MOTORS DRIVES LEARNING OUTCOMES

Brushed-DC Motor Drive: Identify the electrical and mechanical parameters to formulate the steady-state model of the brushed-DC motor. Design linear torque and speed controllers. Generate firing pulses for the converter based on controllers' outputs. Observe the performance of the overall controlled system when varying the load torque at the motor shaft.

Squirrel-cage Induction Motor Drive: Design indirect field-oriented flux control. Design torque and speed controllers. Repeat the exercises related to firing pulses and overall system performance observation.

Permanent Magnet Synchronous Motor Drive: Understand Clarke, Concordia, and Park transformations. Design hysteresis self- and vector-current controller. Design speed controller. Repeat the exercises related to firing pulses and overall system performance observation.

Doubly Fed Induction Motor Drive (DFIM): Design the rotor-side vector current controller. Design speed controller. Repeat the exercises related to firing pulses and overall system performance observation.