Electric Machines Courseware

OP1160

"This courseware helps to master synchronous and asynchronous machines, from parameter identification to full operation in generator and motor modes."

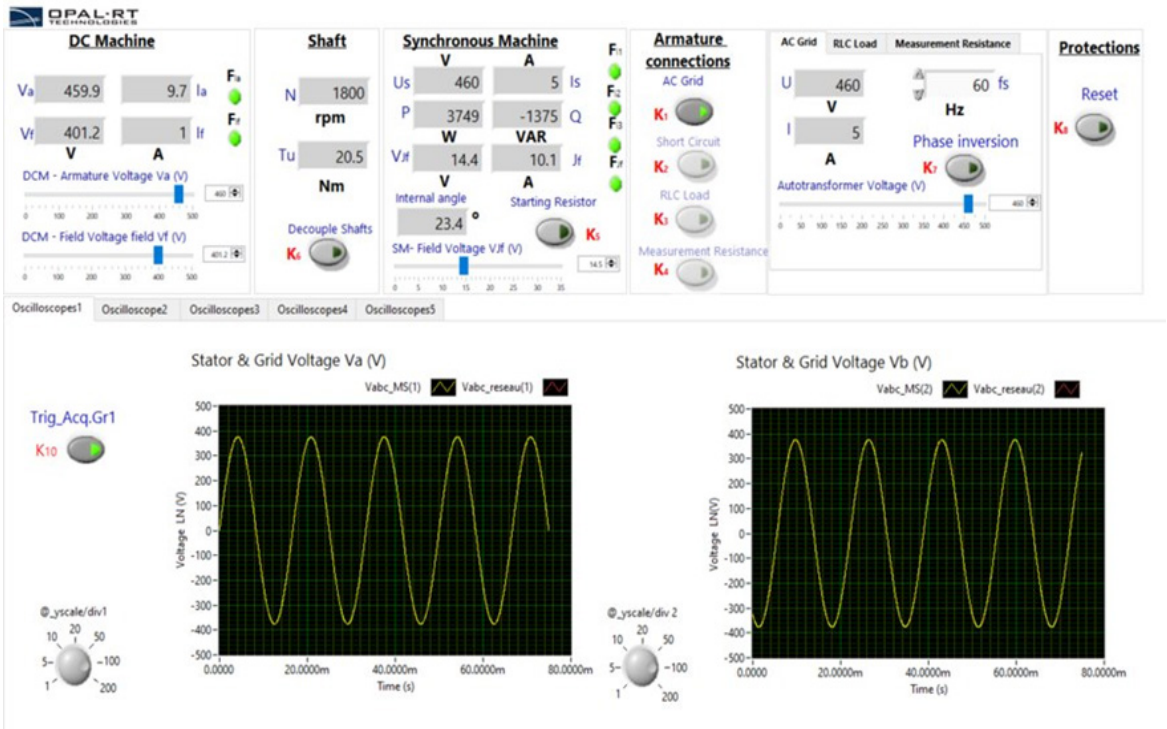
Danielle Nasrallah, eng, Ph.D, Courseware Offering Manager and Robotics SME

The courseware is intended to teach the fundamentals of electric machines to universities' undergraduates and colleges' students. Students are in-the-loop, interacting with virtual machines and doing experiments as they would with physical test benches. As a result, they will fully grasp the identification of steady-state model parameters, synchronous machine generator and motor operations, and asynchronous machine speed control.

MAIN BENEFITS

- An interactive user interface brings the students into the loop and allows them to perform step-by-step experiments.
- Avoid costly damage or significant impact that could be caused by errors, such as overspeeding.
- Protection is implemented and allows students to reset the experiment, making it possible to recover from mistakes.

INTERACTIVE PANEL



Electric Machines Courseware

OP1160

SYNCHRONOUS MACHINE LEARNING OUTCOMES

Parameters Identification: Identify electrical and mechanical parameters to formulate the steady-state model of the synchronous machine.

Synchronous Generator with Passive Load: Feed a variable passive load with the synchronous generator without being connected to the grid.

Synchronous Generator Connected to the Grid: Apply the synchronization procedure, understand stability limits, internal angle, and power flow.

Synchronous Motor: Drive a variable torque load composed of a DC generator connected to variable resistive load. Measure and draw the V-curves.

Fault & Recovery: Apply a three-phase short-circuit on the stator of the synchronous generator then clear the fault. Obtain short-circuit currents and recovery voltages.

ASYNCHRONOUS MACHINE LEARNING OUTCOMES

Transformer and Frequency Converter: Use the wound rotor asynchronous machine to operate as a phase-shifter transformer and frequency converter.

Parameters Identification: Identify electrical and mechanical parameters to formulate the steady-state model of the asynchronous machine.

Speed Control with Variable Voltage: Apply variable voltage with fixed frequency to the asynchronous motor to obtain variable speed at the motor shaft.

Speed Control with Variable Resistance: Change the value of the rotor resistor of the asynchronous motor to obtain variable speed at the motor shaft.

Speed Control with Three-phase Inverter: Use a three-phase two-level inverter to change voltage and frequency of the asynchronous machine to obtain variable speed at the motor shaft.