Short Course 1: Model-Based Design for Electric Powertrain Systems
Wednesday, June 19th, 2019
2:00PM – 5:40PM (3:20PM-4:20PM Coffee Break in Exhibit Hall)
Venue: Cornerstone 6

Instructors:
Dr. Dakai Hu – Mathworks
Dr. Javier Gazzarri - MathWorks

Short Biography:
Dakai Hu is an application engineer at MathWorks supporting customers adopting Model-Based Design for motor and power controls. Prior to joining MathWorks, Dakai worked for Emerson Network Power on the controller design of 400 kVA to 1600 kVA uninterruptible power supplies. Dakai received his Ph.D. in electrical engineering from the Ohio State University. While studying at OSU, he published five first-author conference and journal papers, with topics related to motor control and hardware-in-the-loop simulation designs.

Javier Gazzarri is a Principal Application Engineer at MathWorks in Novi, Michigan, specializing in simulation tools as part of Model Based Design. His work focuses on battery modeling, from cell-level to system-level, parameter estimation for model correlation, battery management system design, thermal management, aging diagnosis, and state-of-charge estimation algorithms. Before joining MathWorks, Javier worked on fuel cell modeling at the National Research Council of Canada in Vancouver, British Columbia. He received a Mechanical Engineering Bachelor’s degree from the University of Buenos Aires (Argentina), a MASc degree (Inverse Problems), and a PhD degree (Solid Oxide Fuel Cells) both from the University of British Columbia (Canada).

Summary:
In this session, MathWorks engineers will describe how modeling and simulation are being applied by engineering teams at different points along the development V-cycle. In the early design stages, system level simulation helps them to explore design options. A wide variety of battery only and hybrid electric powertrain topologies are considered. Design studies are used to assess the fuel economy and performance of candidates to select the optimal powertrain configuration.
As development moves down the V-cycle, the focus shifts from system to subsystem level requirements. At this stage, more detailed simulation models are brought in to answer questions, such as what kind of battery will be required to meet the demand of the system. Similarly, detailed motor models are used to determine the optimal motor control strategy for a given powertrain and battery system.

Over the course of this tutorial, MathWorks will demonstrate:
• How to use system level vehicle simulation for powertrain selection
• How to use battery modeling tools to meet system level requirements
• How to use simulation to develop optimal motor controls
• How to integrate these designs and validate the system level performance