EXHIBITOR

MathWorks®

High-Fidelity Motor Modeling for HIL with FPGAs

Real-time capabilities are drastically increasing what testing can be done for electric powertrains. Important physical effects such as spatial harmonics and high-speed switching of wide bandgap devices can be achieved in the same model. Additionally, you can run these models in parallel with virtual vehicles. This allows you to connect the device under test (DUT), the motor controller in this example, with a virtual or real ECU for expansive test coverage. You can also use these same techniques to implement virtual dynamometers if ECU integration is unnecessary. See how the approaches presented are hardware agnostic and can often take advantage of existing lab equipment.

Joel Van Sickel is an application engineer at MathWorks who focuses on electrical simulation and control. He specializes in power electronics and power systems. He worked at Raytheon for five years designing power supplies for radar systems before coming to MathWorks. Prior to working for Raytheon, he received his Ph.D. in electrical engineering from the Pennsylvania State University for work on distributed control of power systems in 2010.

Fuel Cell Virtual Vehicle Models for Fuel Economy, Performance, and Thermal Analysis

Learn about recent advances in modeling fuel cell systems for automotive applications. Explore how to use simulation for fuel-economy study, controller design, thermal analysis, and component selection integrated into a complex, multidomain fuel cell virtual vehicle model that includes:

- A polyelectrolyte membrane (PEM) fuel cell stack with fundamental electrochemical reactions, H2 and air handling systems, and a thermal management system
- An electric powertrain system with a battery, DC/DC converter, and power distribution unit (PDU)
- Supervisory controllers
- Multiple drive-cycle scenarios

Yifeng Tang is an application engineer at MathWorks. He supports MathWorks' tools for multi-domain physical modeling and specializes in the modeling and simulation of mechanical, thermal and fluid systems, such as hydraulic systems, cooling systems, and fuel cells. Prior to joining MathWorks, he worked for Ford Motor Company in the powertrain research department. Yifeng earned his Ph.D. in mechanical engineering from the University of Michigan and a B.S.E. in mechanical engineering from the University of Michigan and Shanghai Jiao Tong University.