

Battery Modeling and Algorithm Development with Simulink

OEM: MathWorks • Duration: 2 Days (16 hrs) • Code: MW-BATTERY-MODELING-AND-ALGORITHM-DEVELO

COURSE MODULES & TOPICS

Day 1 of 2

Getting Started with a Battery Cell

- Define battery terms (cell capacity, C-rate, open circuit voltage)
- Model a cell using the equivalent circuit model
- Adding cell thermal effects and cell degradation effects
- Construct charging and discharging circuit with Simscape™ Battery™

Cell Characterization

- Prepare the model and the experimental data for cell characterization
- Overview of parameter estimation
- Perform cell characterization

Battery Pack Modeling

- Create battery modules and packs objects using the Battery Builder App
- Generate customized module and pack blocks for simulation
- Model ambient and cooling heat dissipation paths
- Attach cooling plates with battery objects

Day 2 of 2

State Estimation

- Estimate the State-Of-Charge of a cell using Coulomb Counting and Extended Kalman Filter
- Estimate the State-Of-Health of a cell
- Estimate the State-Of-Charge and the State-Of-Health of a pack

Battery Management System

- Overview of a battery management system
- Design the supervisory control logic of a battery management system using Stateflow®
- Integrate the Constant-Current Constant-Voltage charging logic and the state estimation algorithm
- Implement a passive cell balancing network
- Create test scenarios for battery management system using Simulink Test™

Fault Monitoring and Current Limit Computation

- Compute charging and discharging current limits based on voltage and temperature constraints
- Inject faults into a battery pack
- Detect voltage, current, temperature, and sensor faults during battery operation