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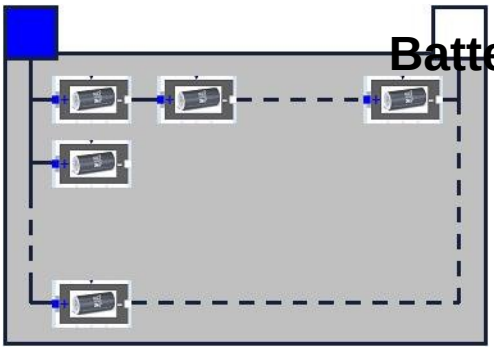
Battery pack modeling



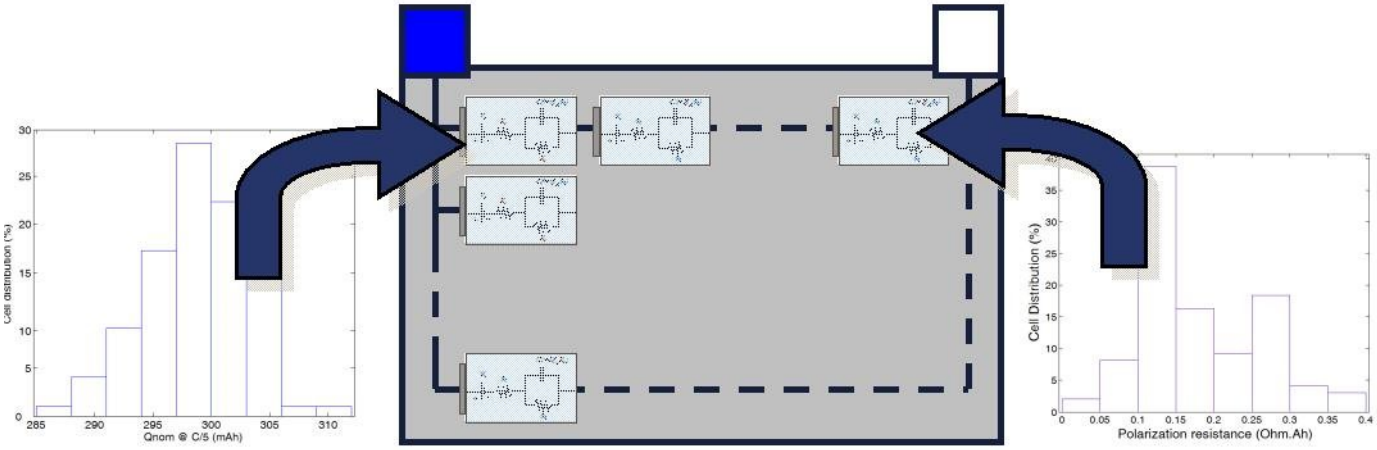
Battery pack modeling

Focused Areas Main List [1]

Other Areas: Understanding Real Life Data [2] - Driving Cycle Analysis [3] - Commercial Cell Evaluation: Understanding Degradation Mechanisms[4] - Cell Modeling [5]

One of the ultimate goals in battery modeling and simulation is to enable prediction of service life of battery packs. This goal remains ambitious yet challenging. The issues related to pack modeling are much more complex than in single cell models, especially for applications that require high power and durability, so a large amount of single cells has to be used. To enable pack modeling and simulation, not only is a reliable cell model with high fidelity and accuracy required, but considerations must also be paid to extrinsic influences that may alter the battery behavior in the pack.

We have developed a unique approach based on a single cell equivalent circuit model that is validated from experimental data using specific protocols in the laboratory testing in order to define the accuracy of the model. In parallel, we also need to obtain and characterize a statistical distribution of cells in terms of nominal capacity arisen from variations in the amount of active materials and internal resistance in the cell. This natural variance in cell quality is going to establish the intrinsic imbalance of the battery pack and therefore must be taken into account to establish the baseline expectation of the pack performance characteristics accurately. This baseline performance characteristics will be used to monitor the behavior of the battery pack through its life characterization to assess its reliability and safety. Computer modeling and simulation is an enabling tool to allow quantitative analysis of such life characterization as the basis for diagnostics.



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