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Cylindrical solar container lithium battery 3D

Overview

How do you simulate a lithium-ion battery in 3D?

This example simulates an air-cooled cylindrical 18650 lithium-ion battery in 3D. A one-dimensional cell model is used to model the battery cell chemistry, and a three-dimensional model is used to model the temperature in the battery. The two models are coupled by the generated heat source and the average temperature; see Figure 1.

How is a thermal model made in 3D?

The thermal model is made in 3D using the Heat Transfer in Solids and Fluids interface. The battery canister (0.25 mm thick) is not included as a domain in the geometry, since the effect of the steel canister on the temperature profile are small, as can be seen in the Thermal Modeling of a Cylindrical Lithium-Ion Battery in 2D model.

What is a scaled heat source in a lithium ion battery?

The heat source term in the active battery material domain is however scaled to account for the lack of heat generation in the current collectors, and for the canister thickness. This scaled heat source is obtained by multiplying the volumetric heat source from the 1D Li-ion battery model by two factors.

How do I add a cylindrical coordinate system to a battery?

In the Settings window for Material, locate the GeometricEntitySelection section. From the Geometricentitylevel list, choose Boundary. Add a cylindrical coordinate system to handle the orthotropic thermal conductivity in the active battery material. In the Definitions toolbar, click CoordinateSystems and choose CylindricalSystem.

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