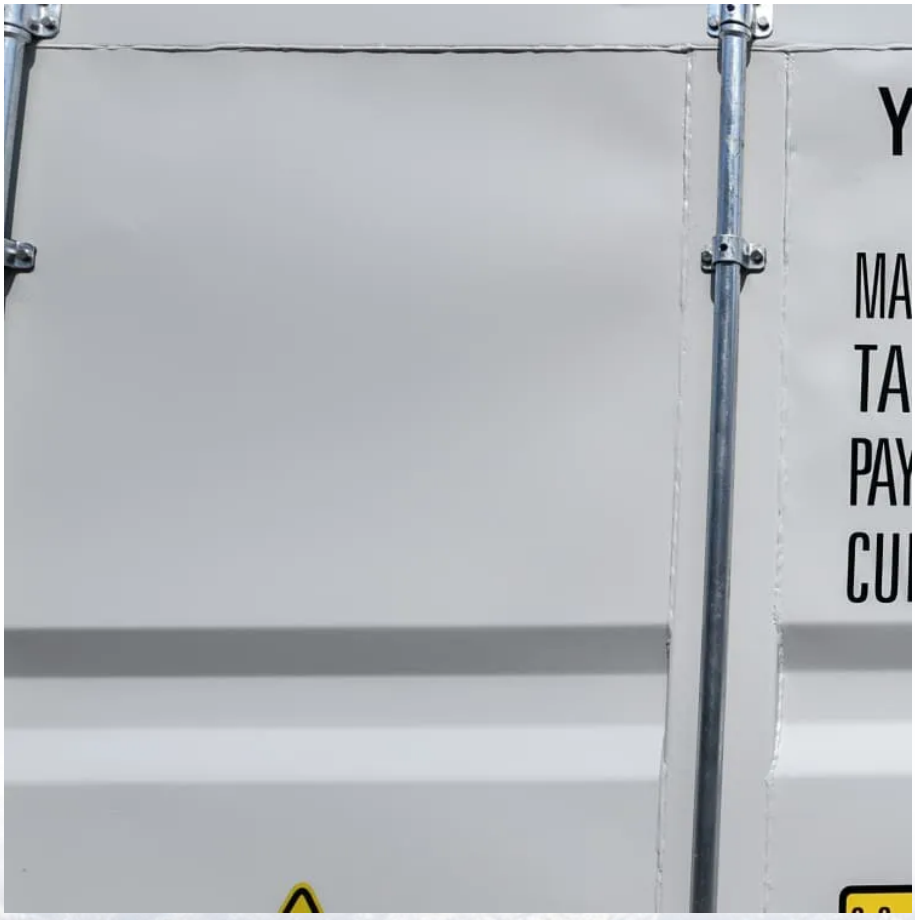
ŁOTWA SYSTEM

Finite element configuration of cylindrical solar container lithium battery



Overview

In this research, a parameterized beam-element-based mechanical modeling approach for cylindrical lithium ion batteries is developed. With the goal to use the cell model in entire vehicle crash simulations.

What is a finite element approach for cylindrical lithium cells?

Conclusion In this work, a finite element approach for cylindrical lithium cells was developed. The stiffness-relevant components of the model consist of discrete beam elements only. Null shell elements were added to define the contacts to the peripheral components and for visualization reasons.

What is a finite element (FE) model for lithium ion cells?

For this finite element (FE) model, material models already used in the literature for components if lithium-ion cells were selected. Metals (casing and current collectors) were modeled using a von Mises-based model with piecewise isotropic strain hardening.

Is a beam-element based mechanical modeling approach suitable for lithium ion batteries?

Anisotropic material behavior is implemented. The model approach is suitable for total vehicle crash simulations. Criterion for short circuit prediction is developed. In this research, a parameterized beam-element-based mechanical modeling approach for cylindrical lithium ion batteries is developed.

Do cylindrical lithium-ion batteries have a thermal stability problem?

This work is motivated by the critical need to improve the thermal stability of cylindrical lithium-ion batteries, especially in electric vehicles and high-performance electronics, where overheating during rapid charging and high discharge rates can lead to thermal runaway and decreased lifespan.

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