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DEM Simulations of the Calendering Process: Parameterization of the Electrode Material of Lithium-Ion Batteries

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Abstract

During the manufacturing of lithium-ion batteries, calendering is the final step in electrode production. It is a crucial process, which significantly influences the mechanical and electrochemical properties of the electrodes and is decisive in defining the volumetric energy density of lithium-ion batteries. To predict the calendering parameters, a particle model using the discrete element method (DEM) is calibrated based on a parameterization framework. The parameterization methodology for calibration applied in this paper is universally valid, applicable to various material systems and based on a one-factor-at-a-time variation to reduce the number of parameters. With this reduced parameter set, an automatic parametrization using optimization algorithms is feasible.

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