# Numerical simulations of lithium-ion batteries using adaptive methods.

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In this work we have considered the numerical simulations of lithium-ion batteries (LIBs) based on a microscale continuum model. This problem leads to a stiff system of differential algebraic equations (DAEs), with strong nonlinearities due to the interface condition between the liquid electrolyte and solid domains. To address the associated numerical challenges, we implement a space-time adaptive strategy for the solution of the governing equations. Earlier work was restricted to a simple 1D half-cell problem [1], showing the benefits of a multi-domain method with adaptive coupling in time. Here we extend this work to several spatial dimensions, and investigate the effectiveness of adaptive mesh refinement along with adaptive time integration.

[1] A. Asad, R. de Loubens, L. François, M. Massot. *High-order adaptive multi-domain time integration scheme for microscale lithium-ion batteries simulations*, 2023.

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