

MSc Thesis Project: Battery Co-Simulations using pyBAMM

Background:

- + pyBAMM (Python Battery Mathematical Modelling) is a popular, open-source Python library for battery simulation
- + co-current simulations (i.e., coupling multiple simulation tools to make predictions of multiphysics phenomena) were very successful in many branches of science (e.g. Fluid-Structure Interaction, simulation of chemical reactors).
- + in this thesis you will explore how such co-simulations can be done in the field of battery modeling

Objective:

- + a suitable coupling library is identified and documented
- + a co-current pyBAMM and CFD (or FEM) multiphysics simulation has been performed and is documented
- + a database with results of co-simulations is available

Tasks:

- + perform reference simulations using pyBAMM (tutorials and models from literature)
- + explore existing coupling libraries, select a suitable library, and establish missing adaptors for co-simulations involving pyBAMM
- + plan, build and execute co-current pyBAMM and CFD (or FEM) simulations
- + build and maintain a database with results of your simulations

Your Profile

- + student of chemical or mechanical engineering with a strong background in continuum (fluid) mechanics; alternatively a chemistry or physics student with a strong background in electrochemistry
- + excellent background in computer simulation (e.g. using a python, FEM or CFD simulation tools)
- + excellent programming skills (python, Matlab, or C++)
- + motivation to acquire skills in the domain of battery (electrochemical) simulation

Organizational Details

- + Start: any time between July and November 2026
- + Duration: 6 months
- + Scholarship: employment at Battery4Life research center or TU Graz IPPT; joint supervision
- + Contact:
 - Silvia Larisegger (Silvia.Larisegger@Battery4life.at)
 - Stefan Radl (TU Graz IPPT; radl@tugraz.at)

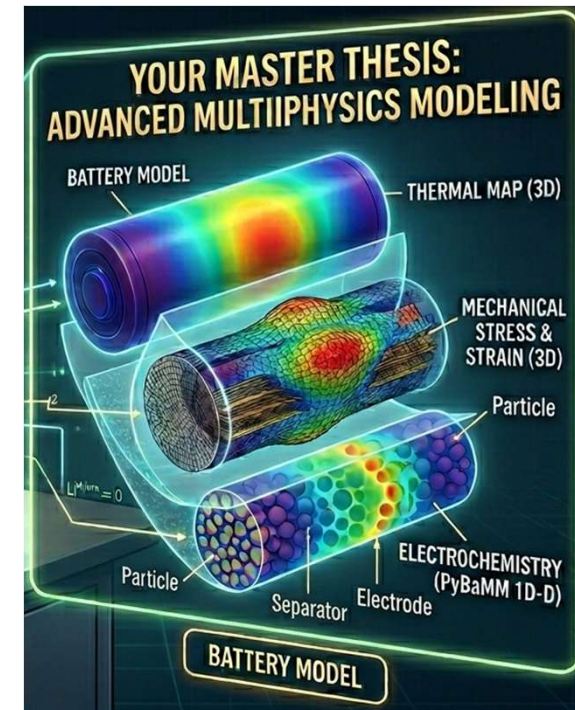


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