

$0 \otimes 0$



Fast diffusion  
in electrolyte

## References

- [1] V. Sulzer, S.J. Chapman, C.P. Please, D.A. Howe
- [2] I.R. Moyles, M.G. Hennessy, T.G. Myers, and B.



# An Asymptotic for Battery

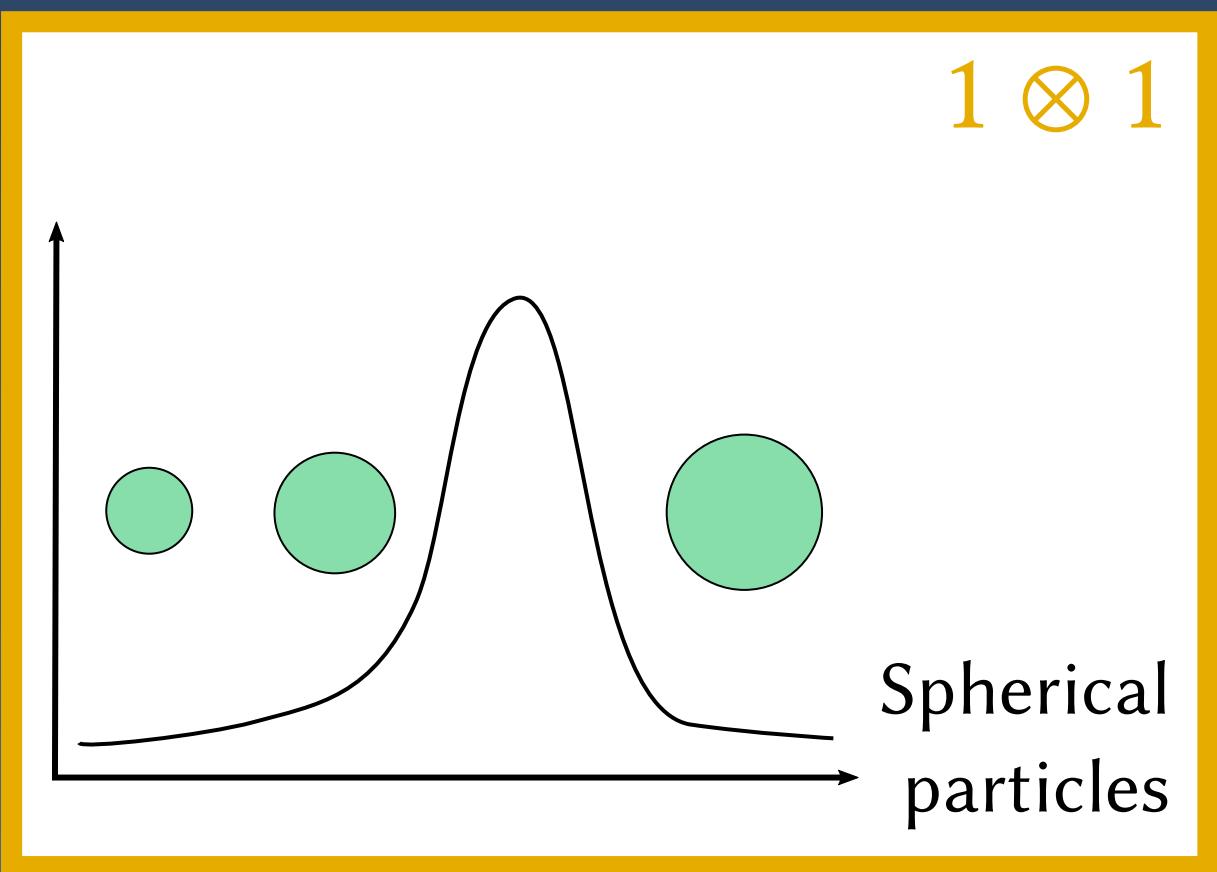
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Jon Chapman, Matt Hennessy,  
Colin Please, Ian Roper, Valeria

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et, consectetuer adipiscing elit. Ut purus  
Nam arcu libero, nonummy eget, conse  
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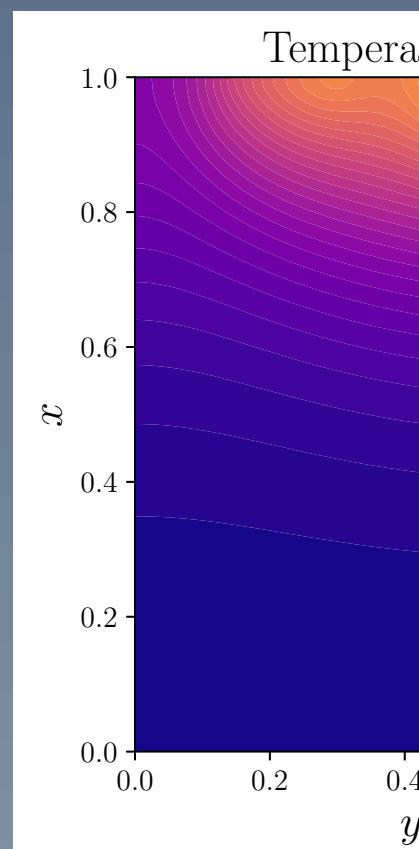
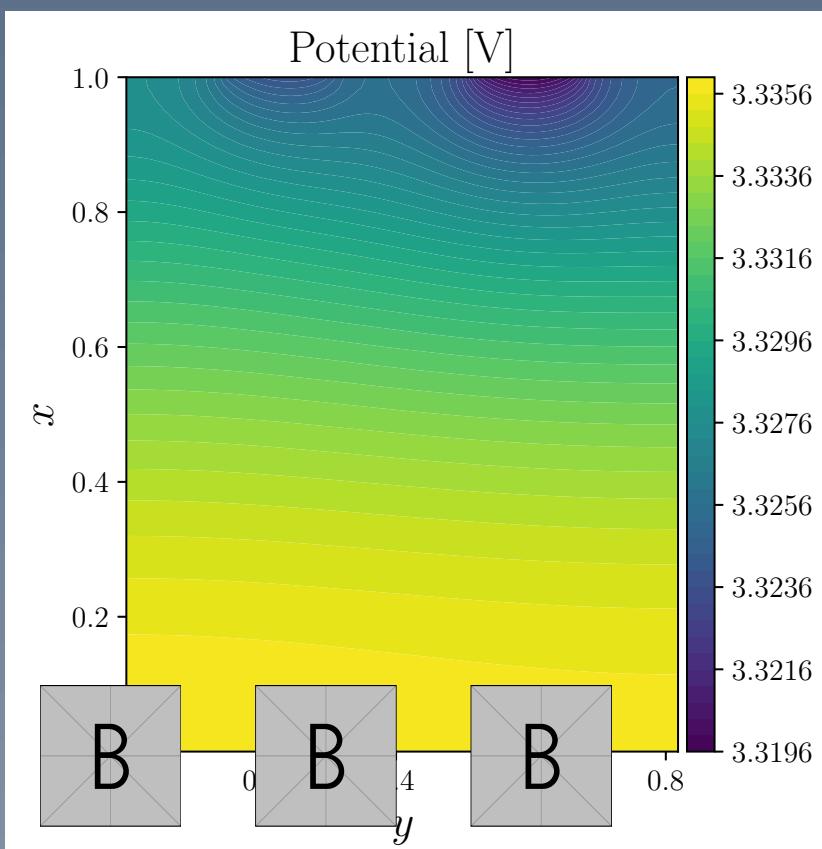
$1 \otimes 1$



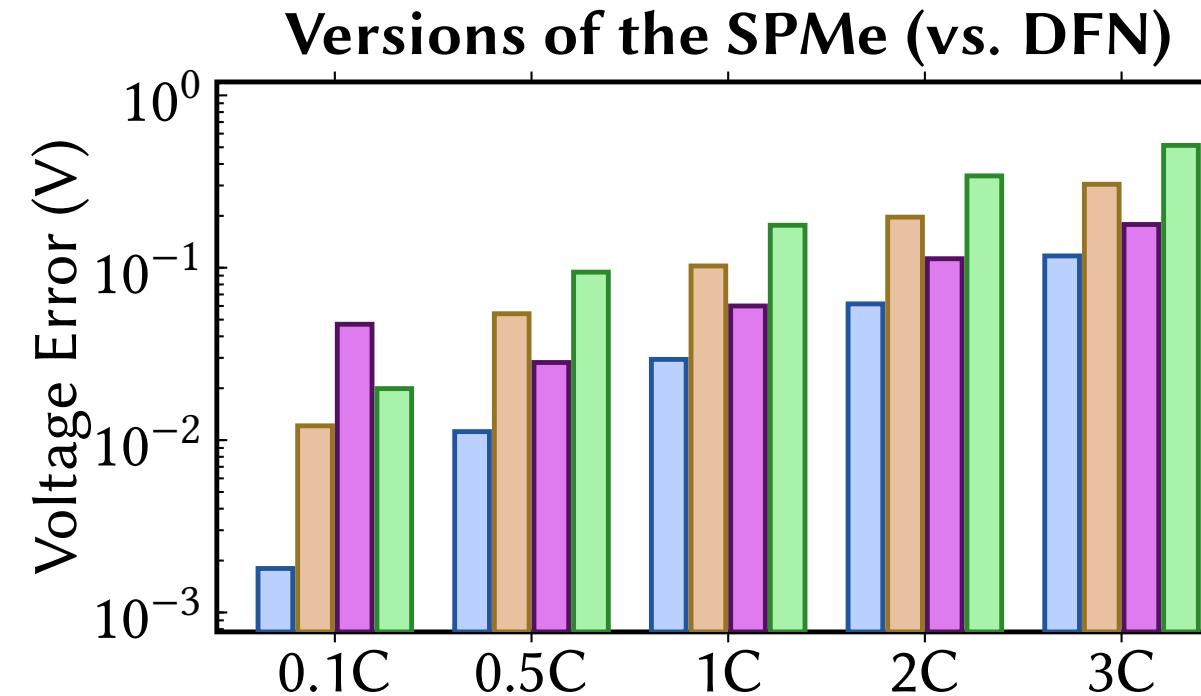
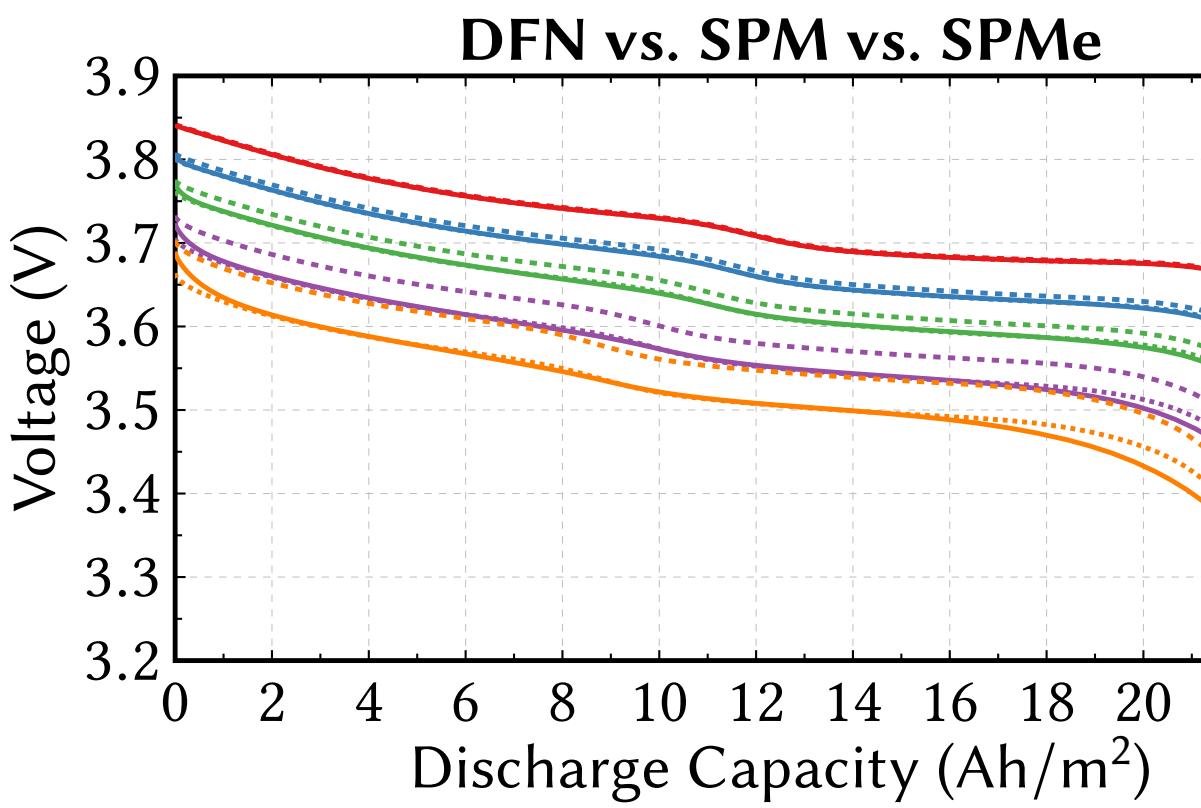
Complex



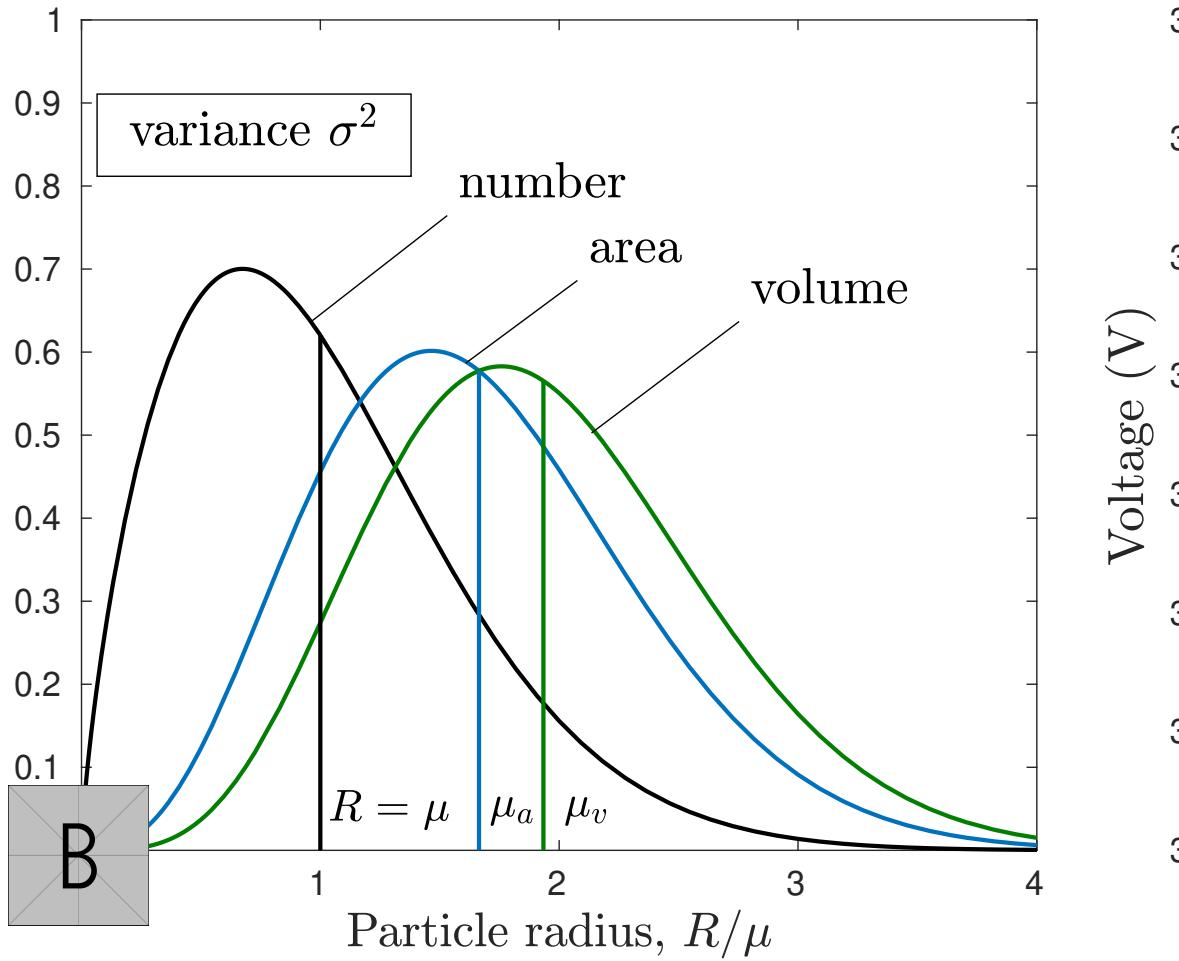
Complex



# MACROSCALE



Simple



y, and C.W. Monroe. Faster Lead-Acid Battery Simulations from Porous Media Models. J. Comput. Phys., 2013, 250, 1–16.  
R. Wetton. Asymptotic reduction of a porous electrode model for lithium-ion batteries. J. Electroanal. Chem., 2013, 700, 1–10.



# ic Framework Modelling

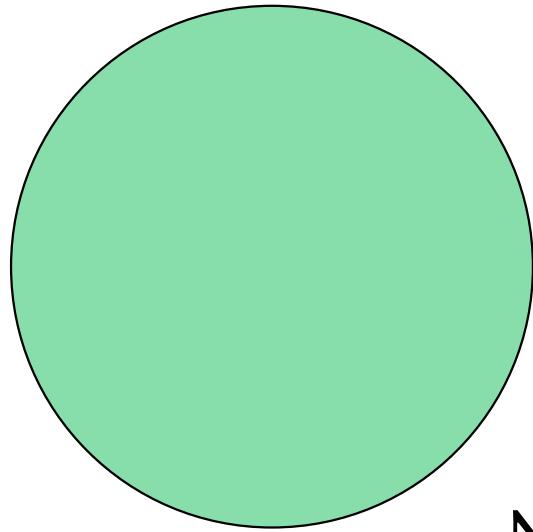
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sy, Toby Kirk, Scott Marquis,  
entin Sulzer, Robert Timms.

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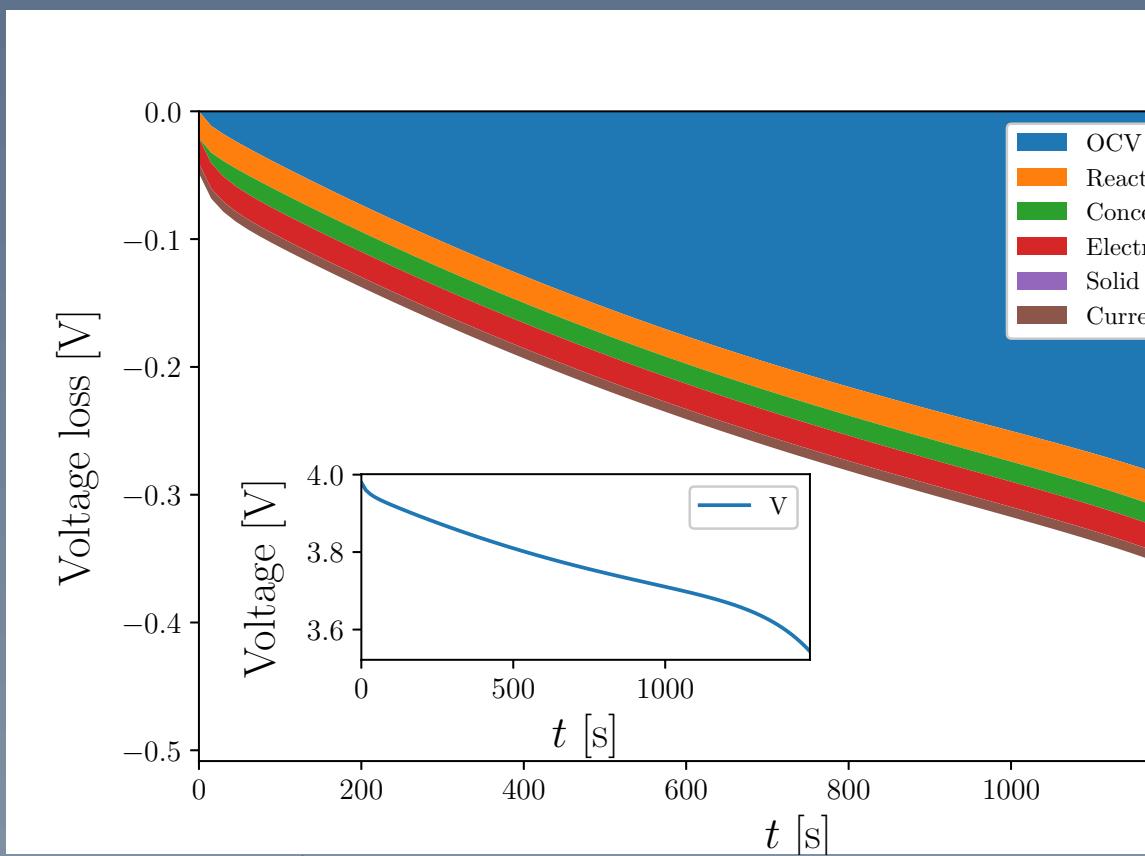
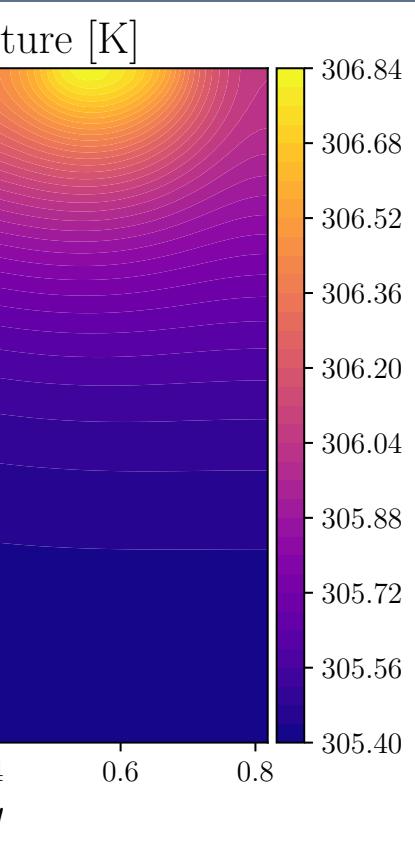
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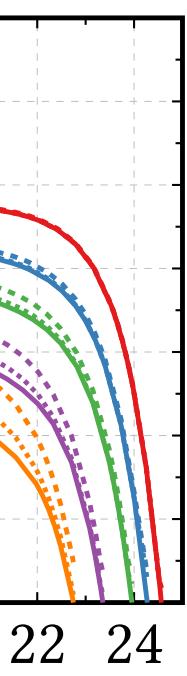
1



Narrow particle  
distribution

# MICROSCALE





— 0.1C  
— 0.5C  
— 1C  
— 2C  
— 3C

— DFN  
... SPM  
.... SPMe

22 24

— Oxford  
— Literature A  
— Literature B  
— Literature C

SPMeCC



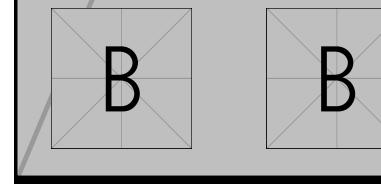
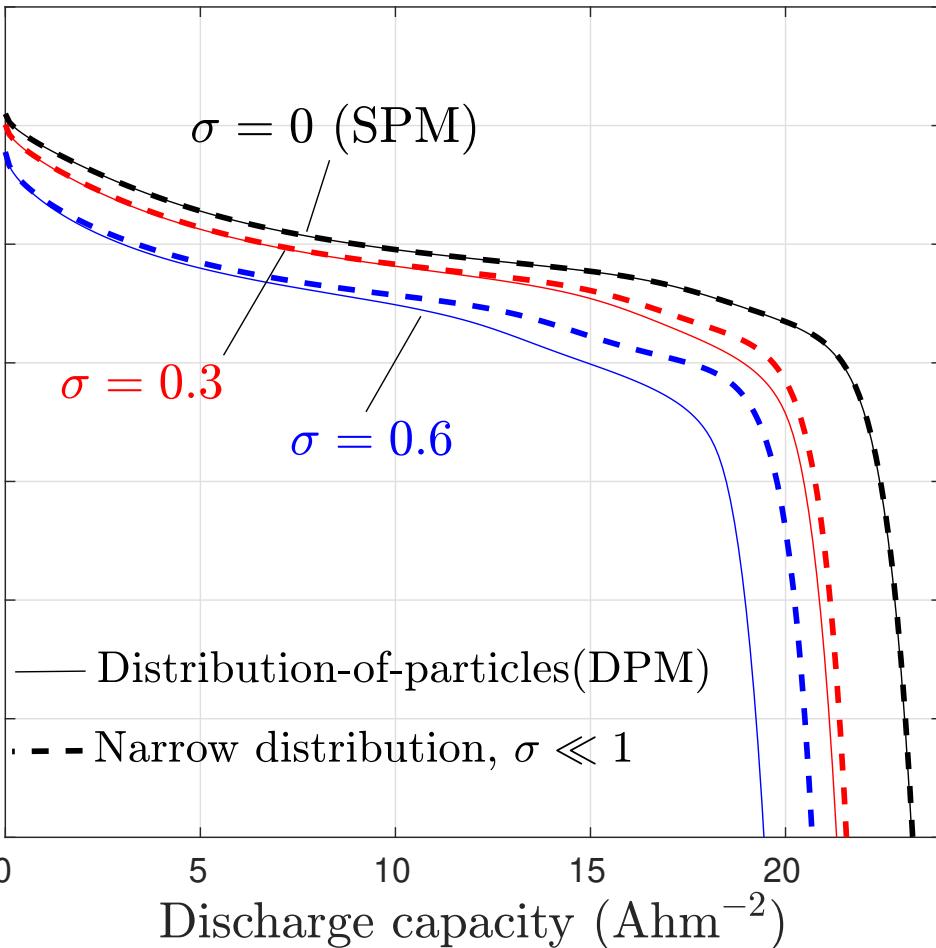
DFN

SPMe

MPM

SPM

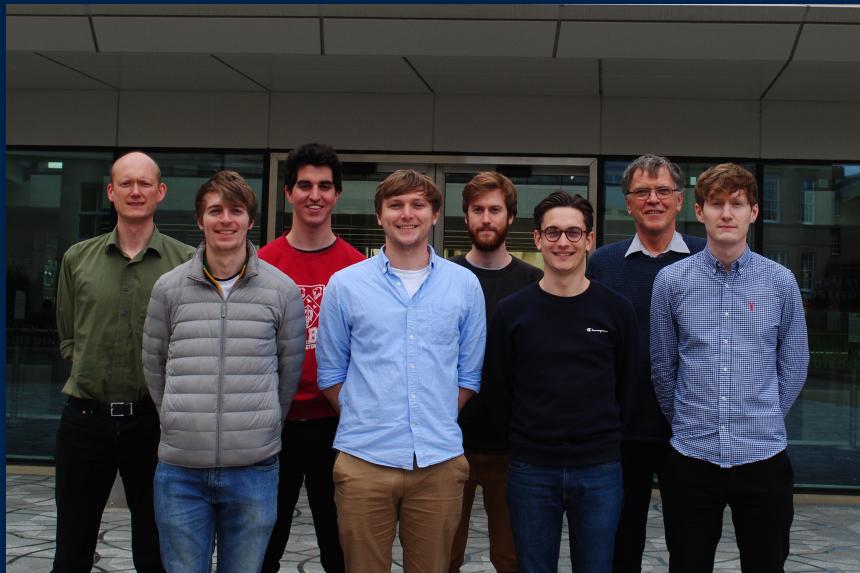
1C discharge, MCMB graphite vs. LiCoO<sub>2</sub>



porous-Electrode Theory: II. Asymptotic Analysis. *Submitted*, 2019. *arXiv preprint arXiv:1805.07099*  
porous-Electrode Theory: I. Numerical Simulation. *Submitted*, 2018. *arXiv preprint arXiv:1805.07099*

SIEMENS

nexeo



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cinc vitae, felis. Curabitur  
vehicula augue eu neque.  
ut leo. Cras viverra metus  
la placerat. Integer sapien  
cibus. Morbi dolor nulla,  
Duis nibh mi, congue eu,

0



Fast diffusion  
in particles

Simple



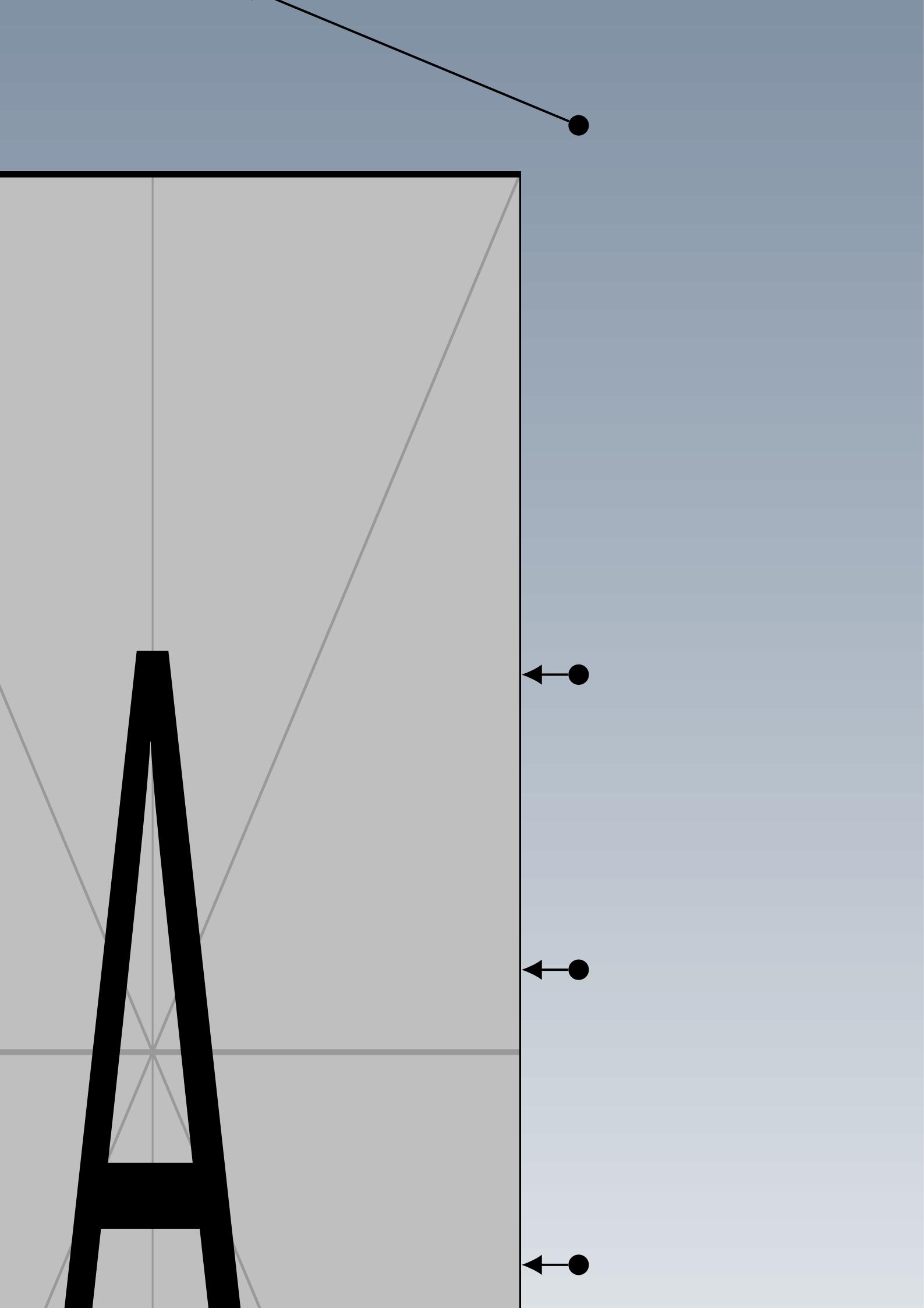
ion overpotential  
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electrolyte Ohmic  
Ohmic  
current Collector Ohmic

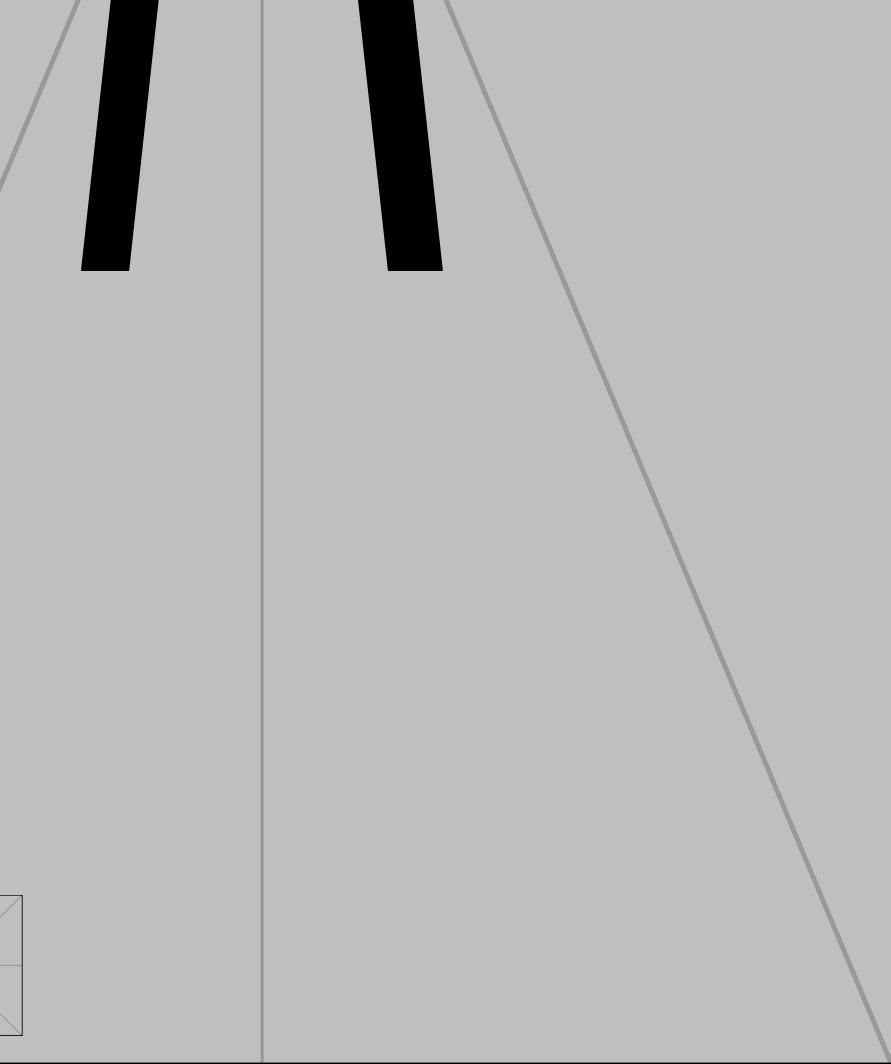


1200

1400







arXiv preprint arXiv:1902.01774  
v3v2



n