«EMR-based control of AC/DC microgrids»

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eifer

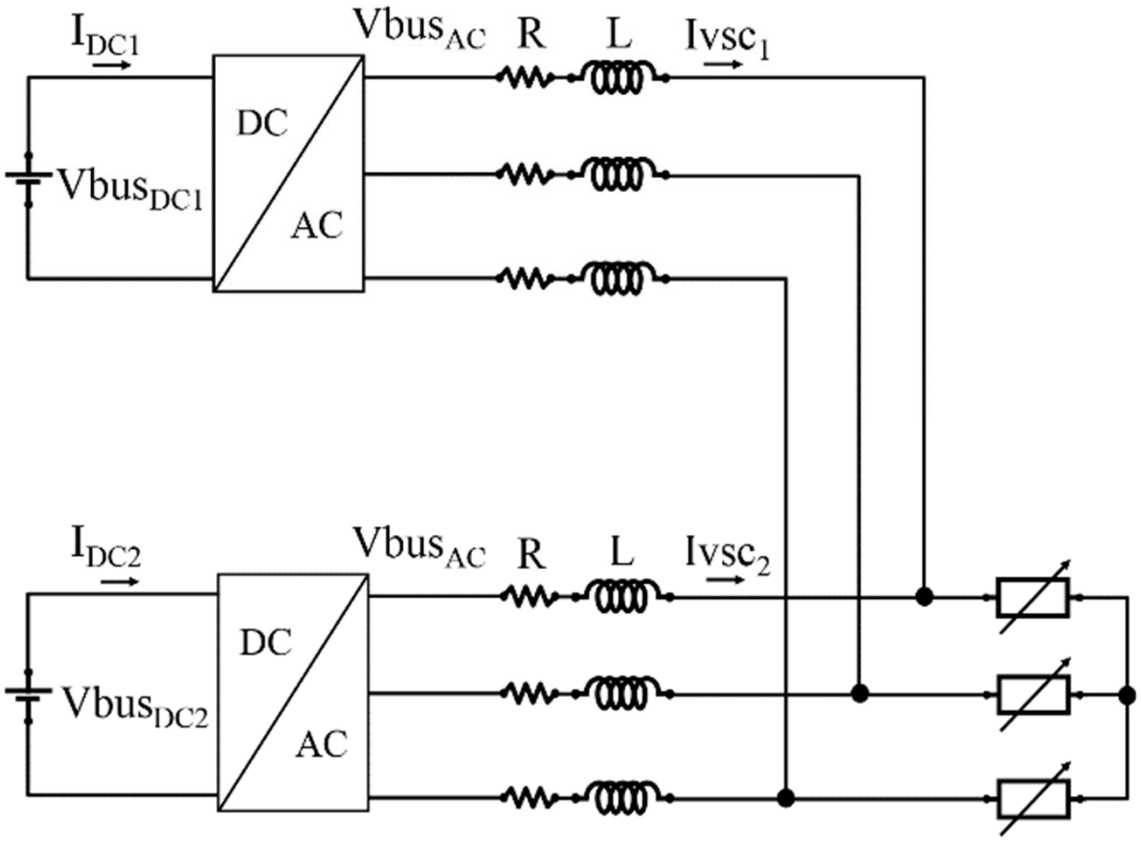
European Institute
for Energy Research
by EDF and KIT

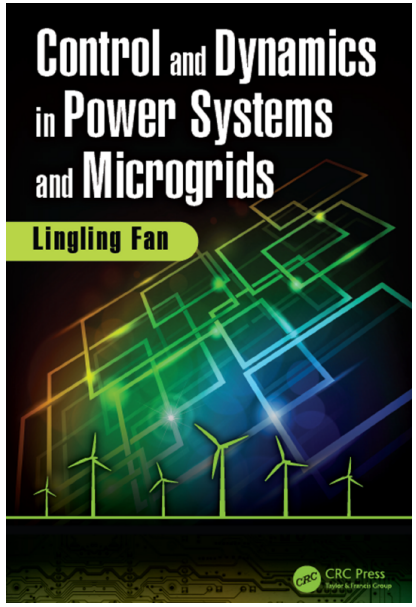
- Outline -

1. **Power Distribution between Two VSC in Droop-PQ Control Mode**

2. **Power Distribution among a Synchronous Generator and Two VSC**

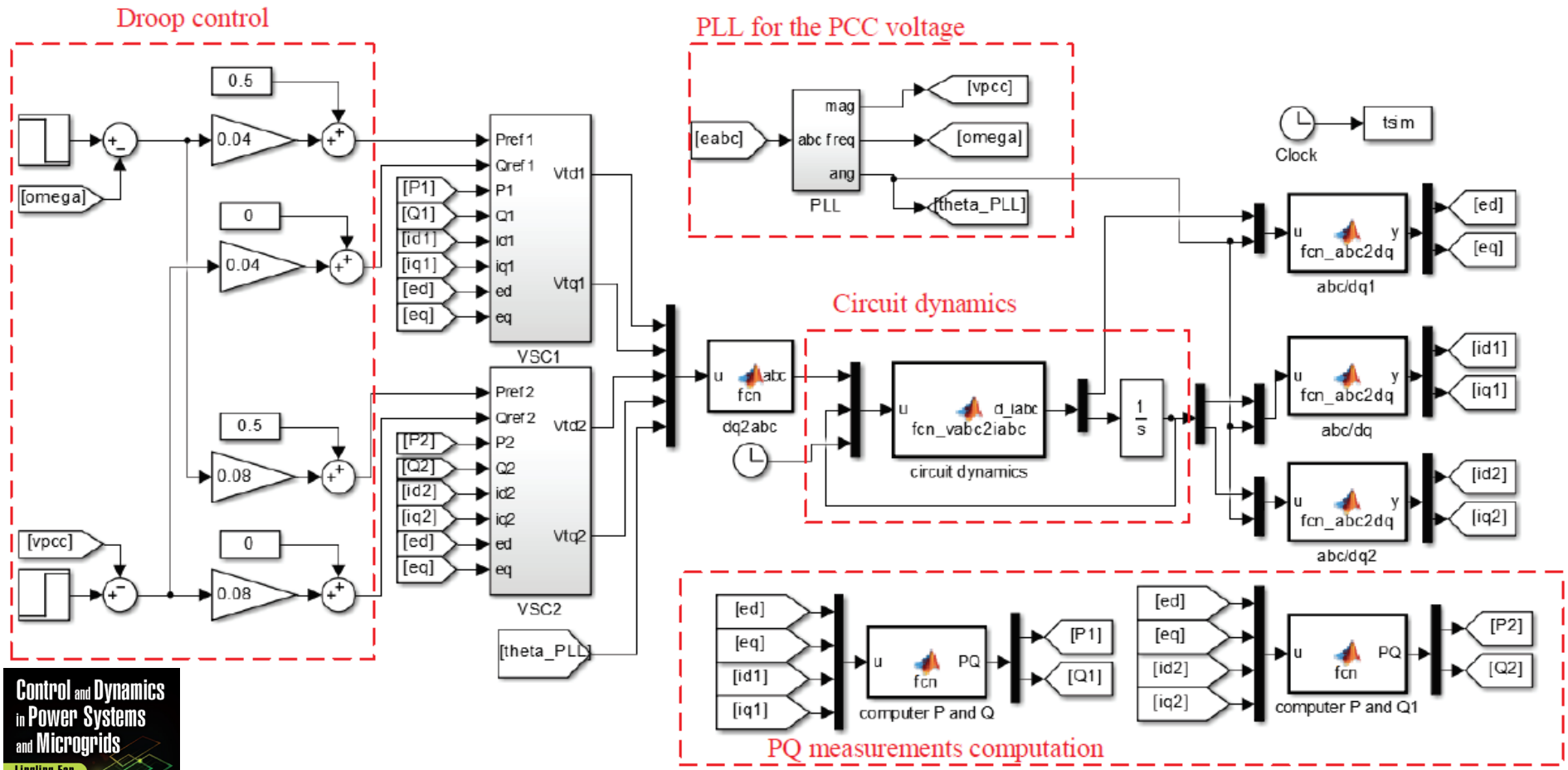
«PART 1. Power Distribution between Two VSC in Droop-PQ Control Mode»

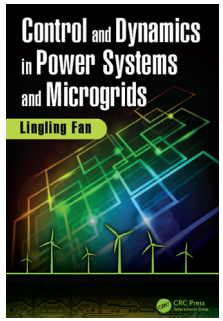




Power Distribution between Two VSC in Droop-PQ Control Mode

- Two VSC in Droop-PQ Control Mode Implementation -





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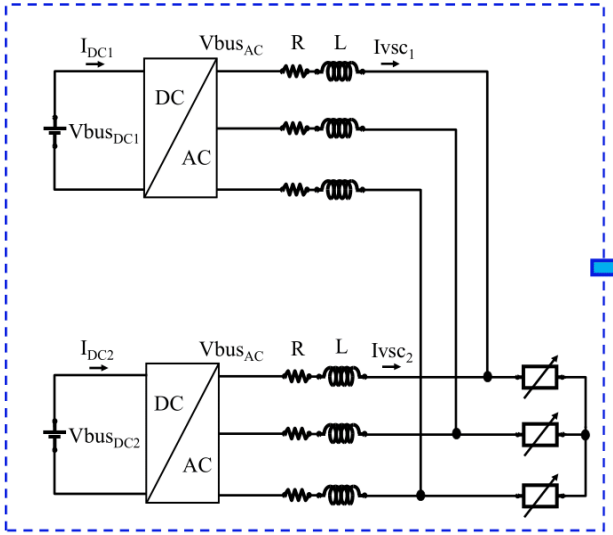
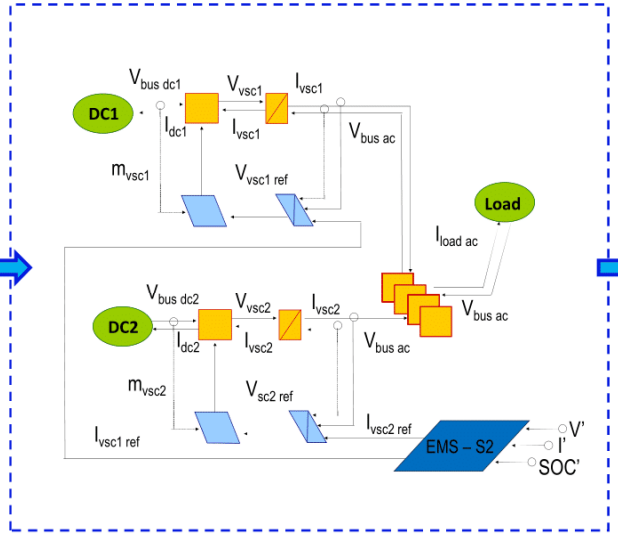
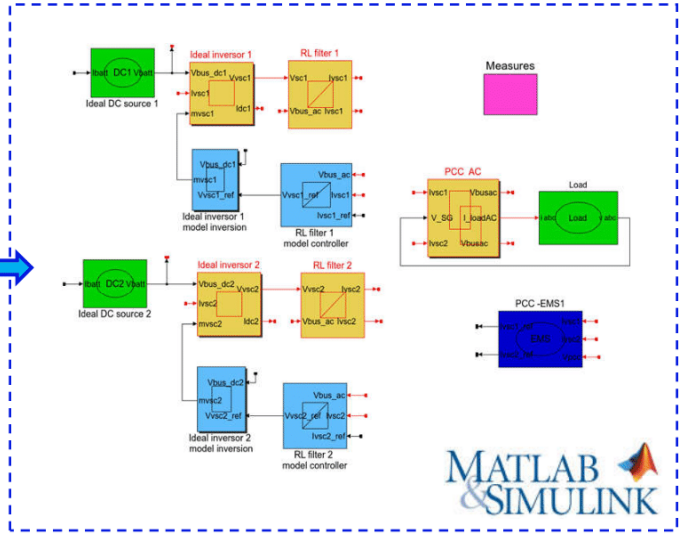
- Using EMR to organize the model in a different way -



AC-DC Microgrid Scheme

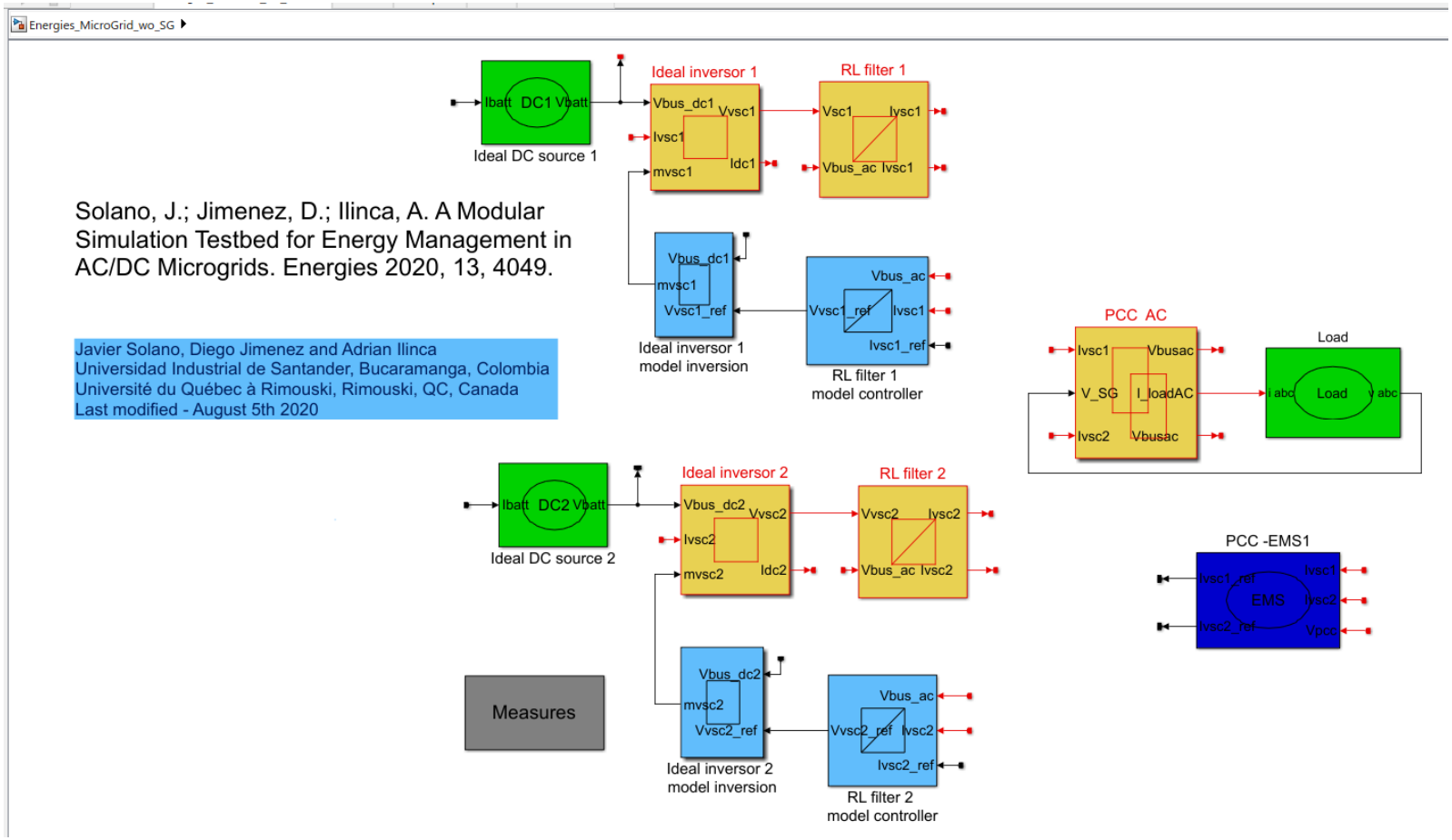


Energetic Macroscopic Representation



Simulation Model

- AC-DC Microgrid EMR and MCS – Matlab screenshot-



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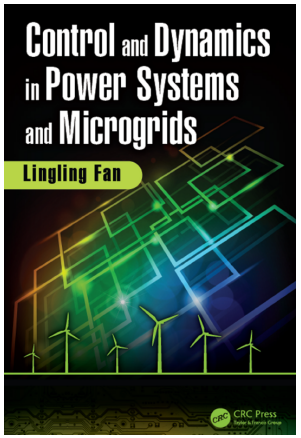
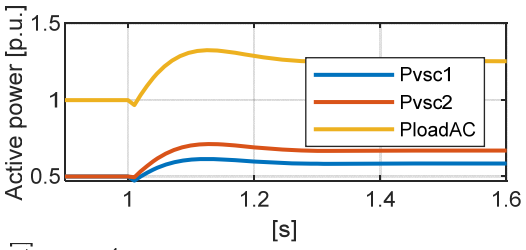
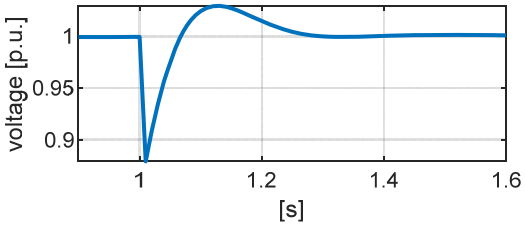
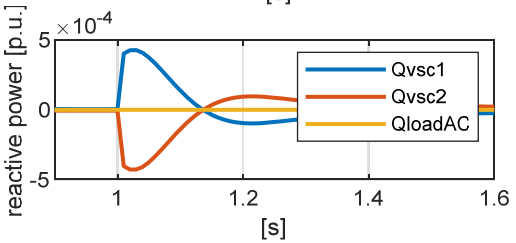
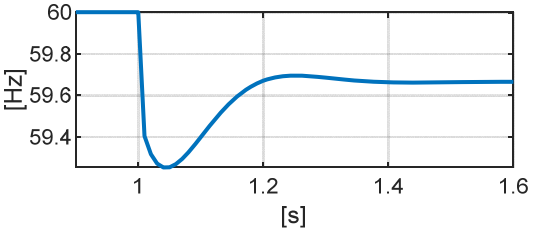
- Simulation results -

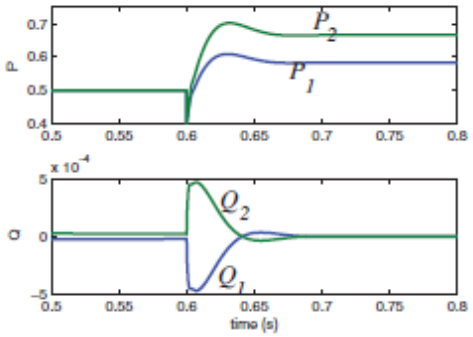


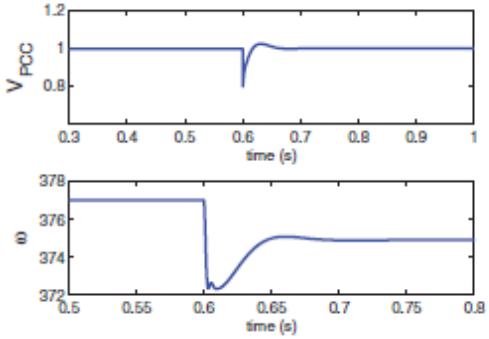


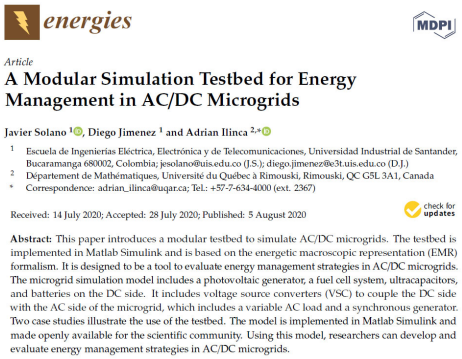












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Article

A Modular Simulation Testbed for Energy Management in AC/DC Microgrids

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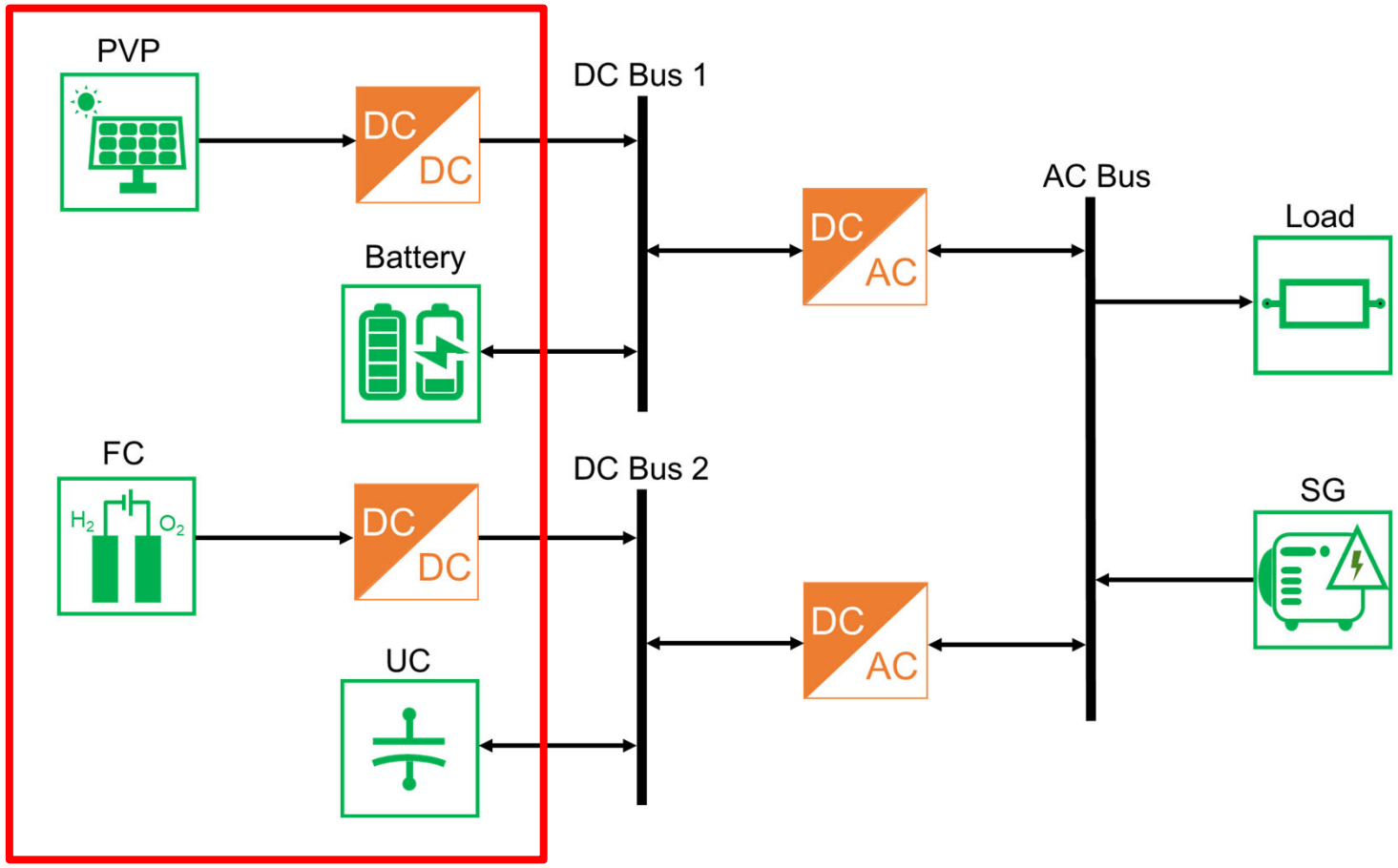
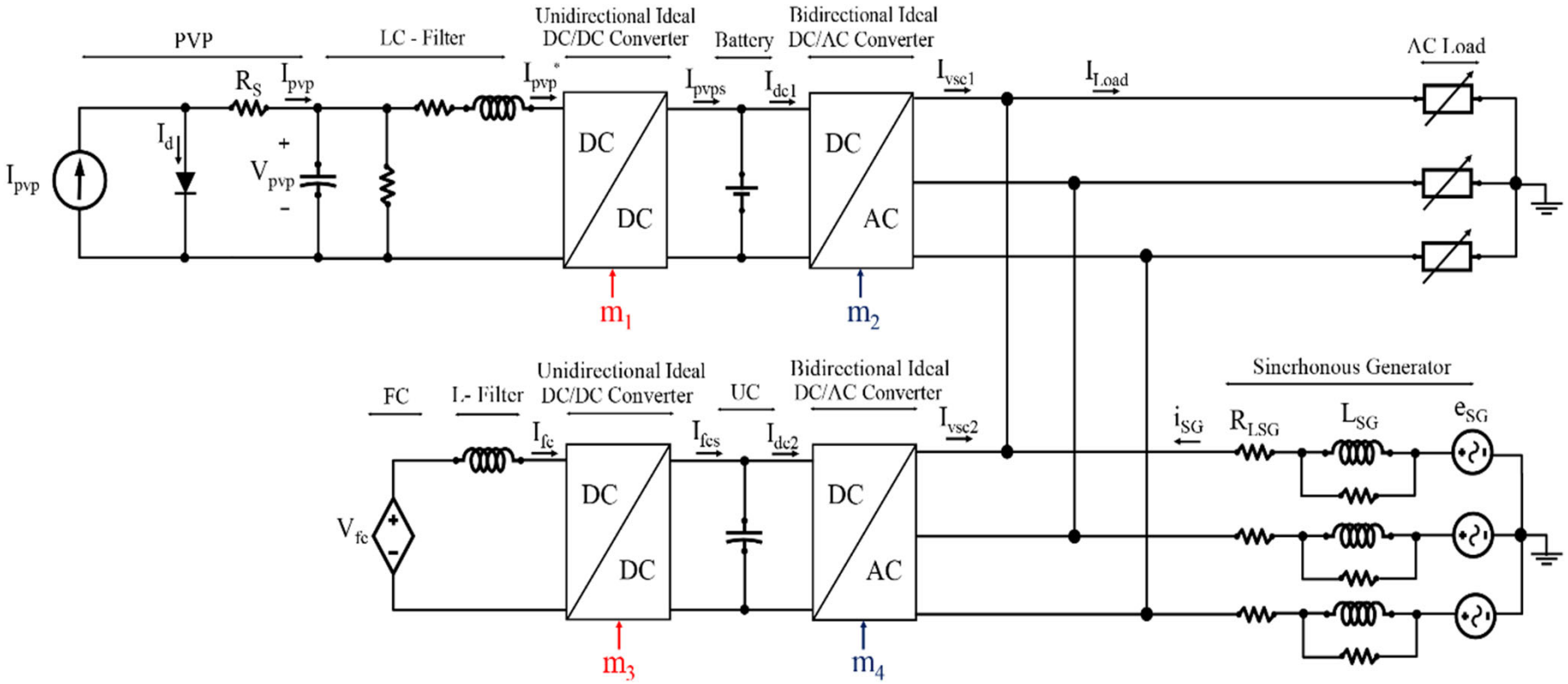
Abstract: This paper introduces a modular testbed to simulate AC/DC microgrids. The testbed is implemented in Matlab Simulink and is based on the energetic macroscopic representation (EMR) formalism. It is designed to be a tool to evaluate energy management strategies in AC/DC microgrids. The microgrid simulation model includes a photovoltaic generator, a fuel cell system, ultracapacitors, and batteries on the DC side. It includes voltage source converters (VSC) to couple the DC side with the AC side of the microgrid, which includes a variable AC load and a synchronous generator. Two case studies illustrate the use of the testbed. The model is implemented in Matlab Simulink and made openly available for the scientific community. Using this model, researchers can develop and evaluate energy management strategies in AC/DC microgrids.

«PART 2. Power Distribution among a Synchronous Generator and Two VSC»

- AC/DC microgrid schematic -



- VSC1 +VSC2 (FC+SC) schematic -



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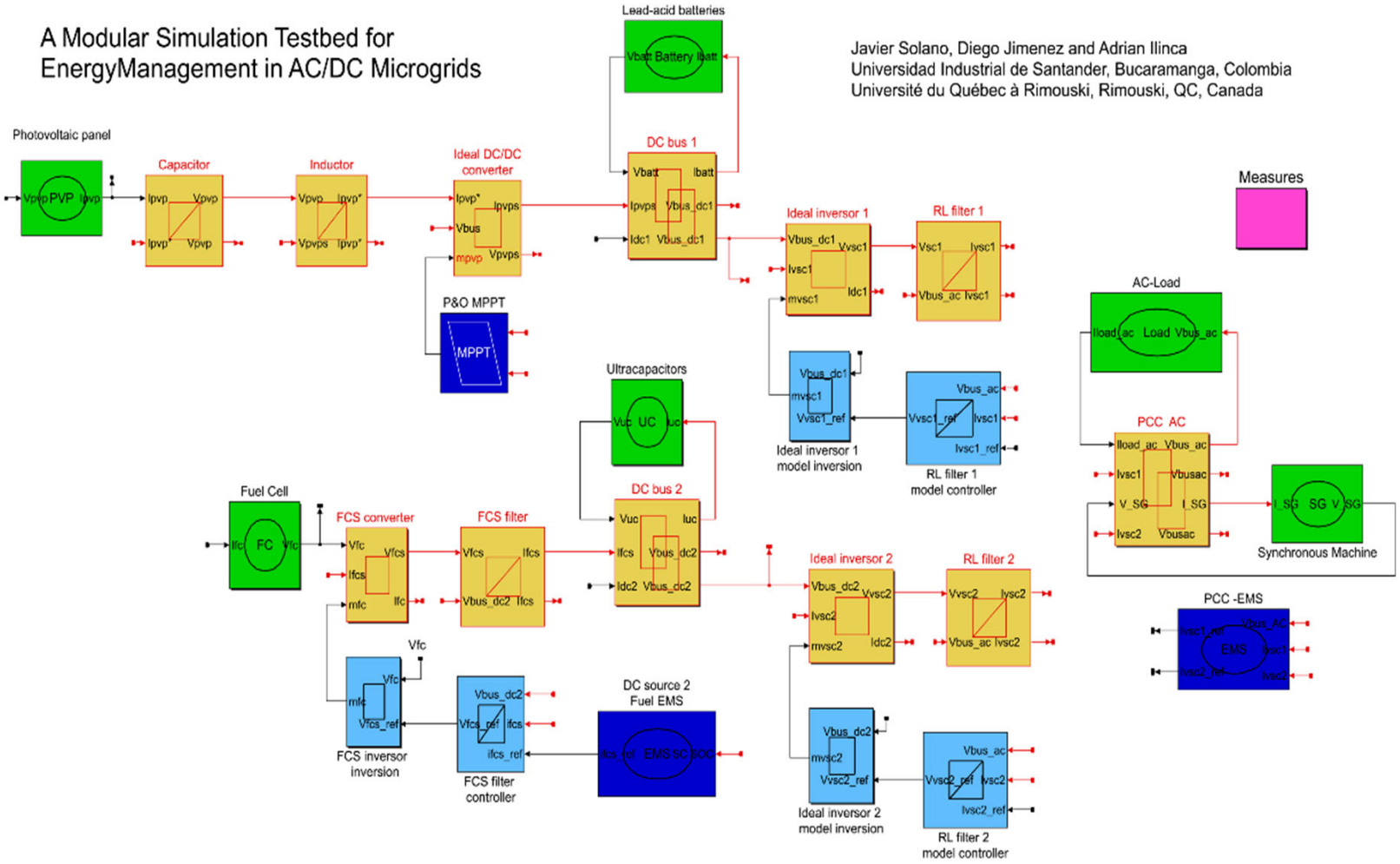
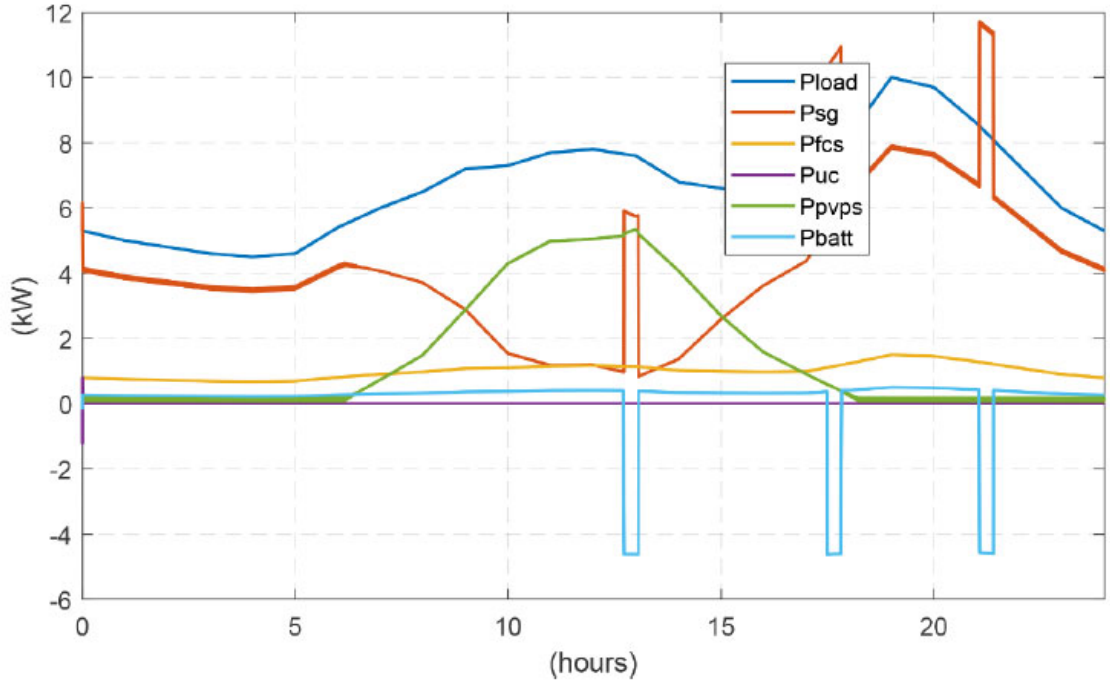
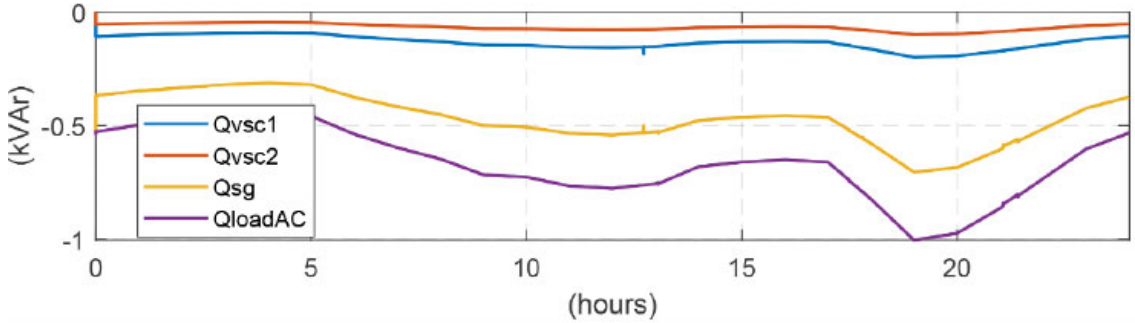
- VSC1+VSC2 + SM + AC load EMR implemented in Matlab -

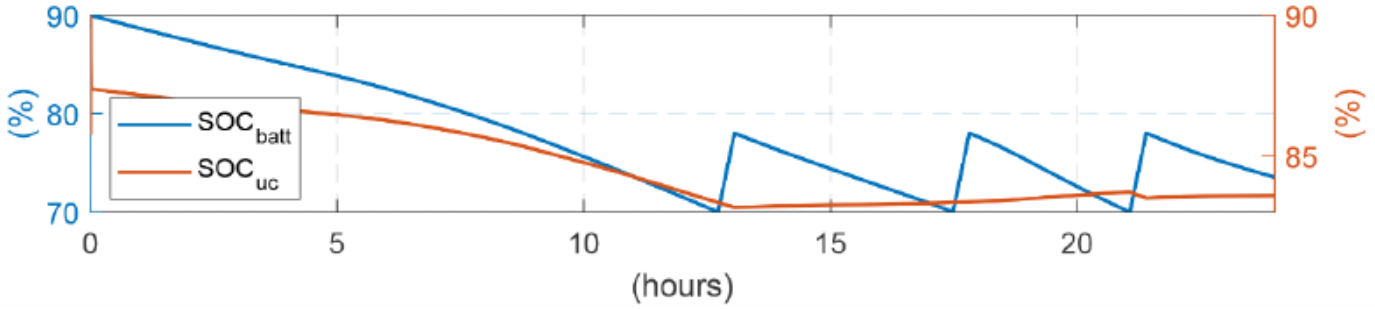




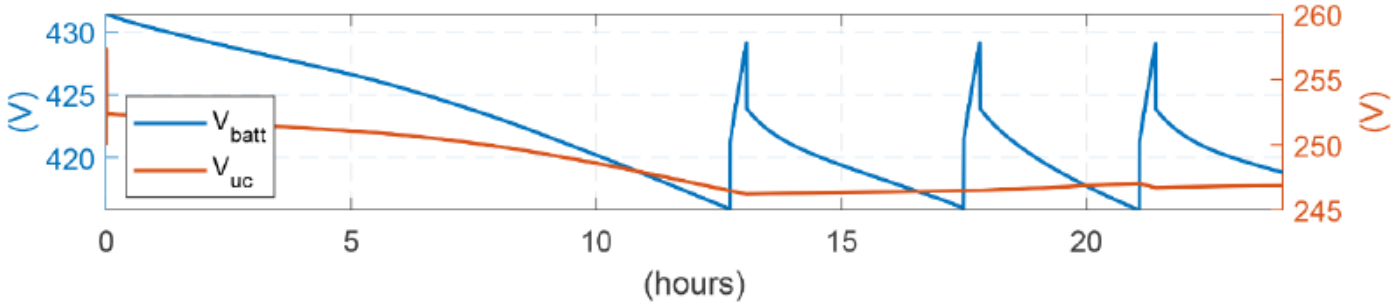
(a) Active AC SG.



(b) Reactive AC SG.

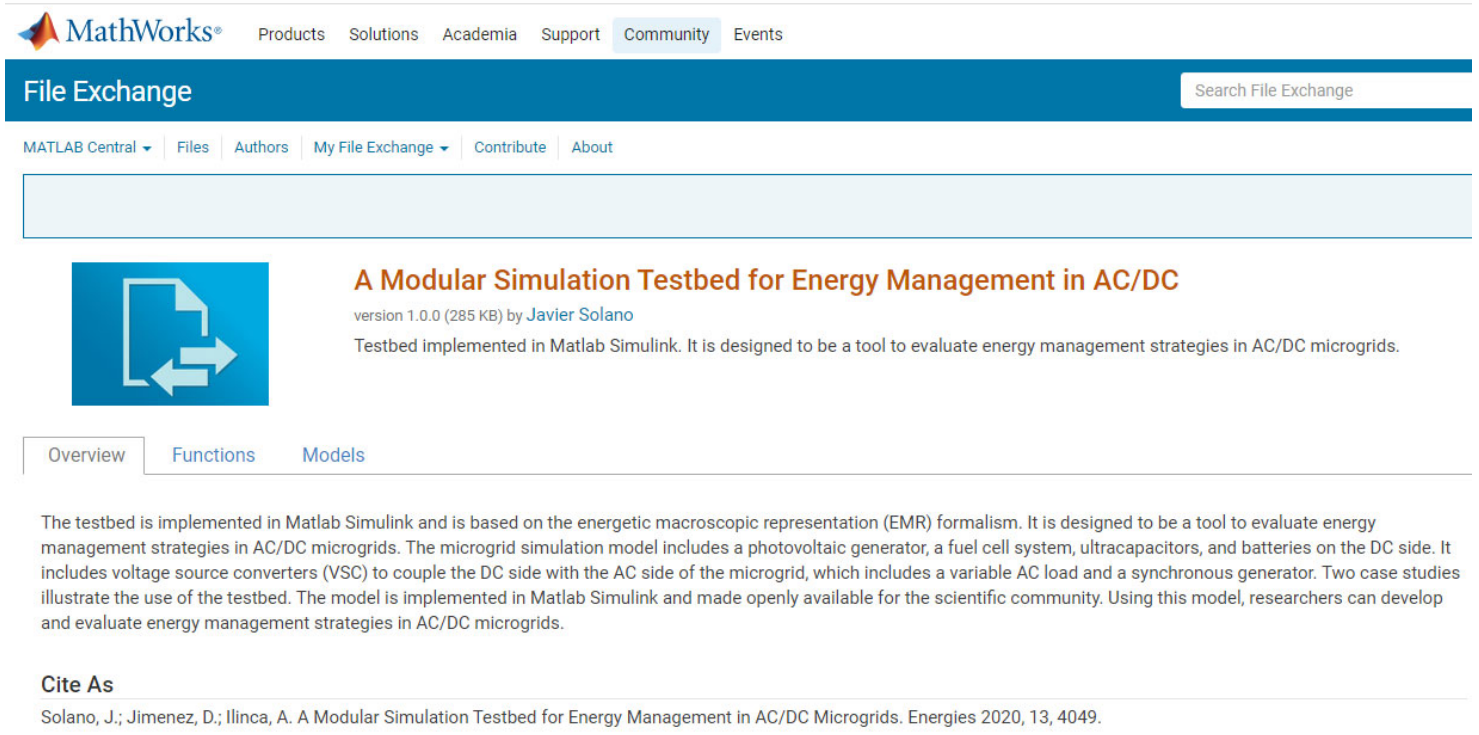


(c) Batteries' and ultracapacitors' SOC.



(d) DC bus voltages.

- A modular simulation testbed for EM in AC-DC MG -



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« BIOGRAPHIES AND REFERENCES »

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[Fan 2017] Fan, L. Control and Dynamics in Power Systems and Microgrids; CRC Press: Cleveland, OH, USA, 2017.

[Solano 2020] Solano, J.; Jimenez, D.; Ilinca, A. A Modular Simulation Testbed for Energy Management in AC/DC Microgrids. Energies 2020, 13, 4049. doi.org/10.3390/en13164049.