Final Event
24-25th of May 2022

Powerful Advanced N-Level Digital Architecture
for models of electrified vehicles and their components

Virtual Demo

EMR library in Simcenter Amesim

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Siemens Industry Software Romania

SIEMENS

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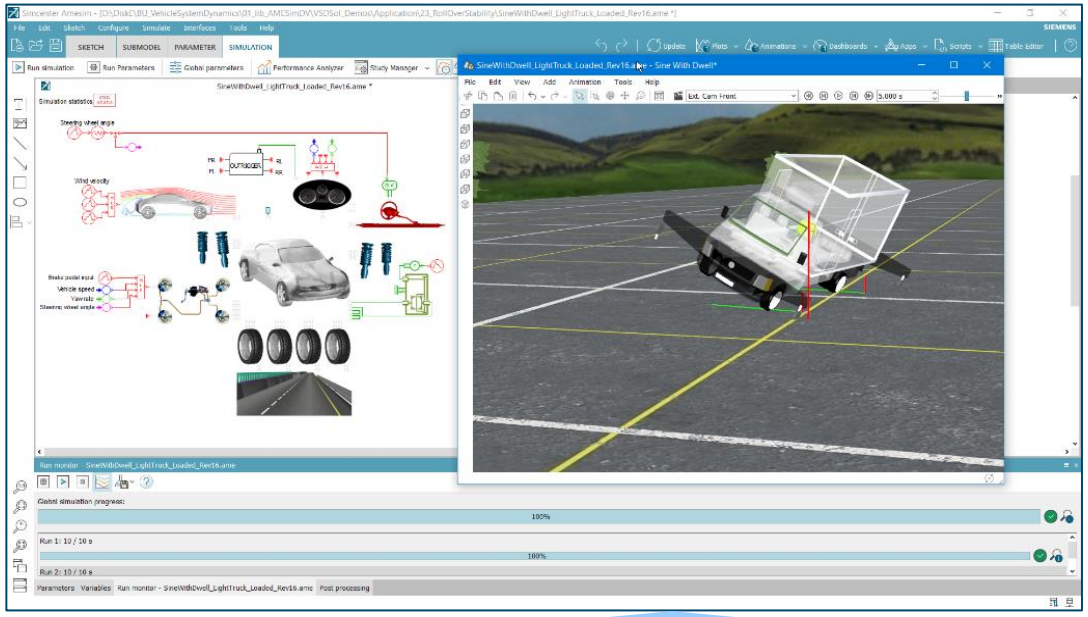
Simcenter Amesim



Model-based system testing

Pre-design

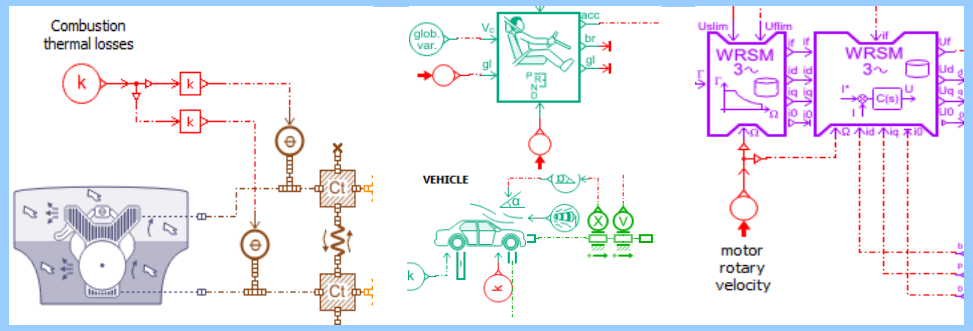
Systems sizing & integration

Performance balancing

Controls validation

Advanced industrial Multiphysics simulation package

based on **structural libraries for models** and a functional library for control



48 libraries (6500 models)

- Hydraulics
- Pneumatics
- Thermal
- Electrical
- Mechanical
- Signals, etc.

new **EMR-based functional library** for models & control

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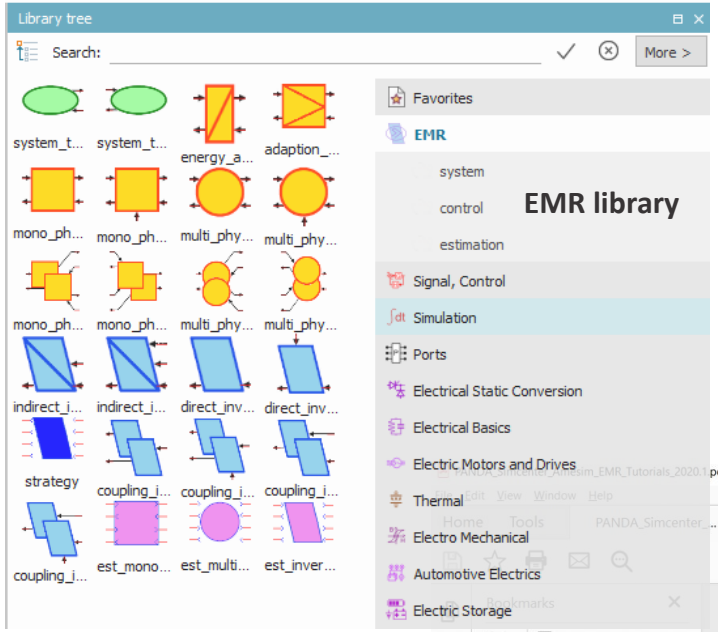
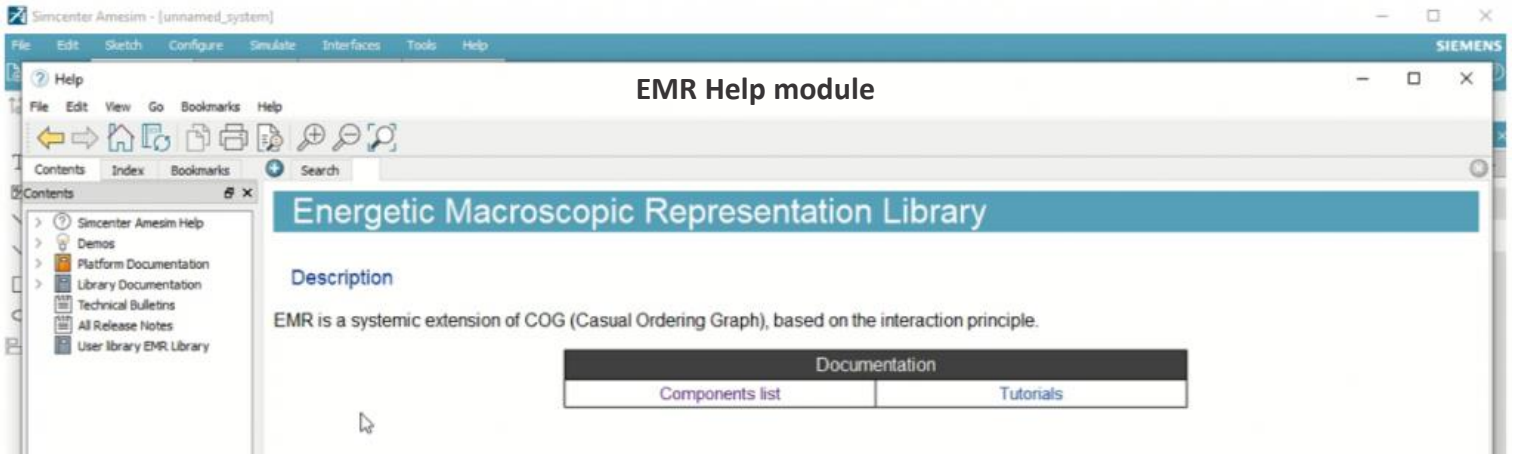
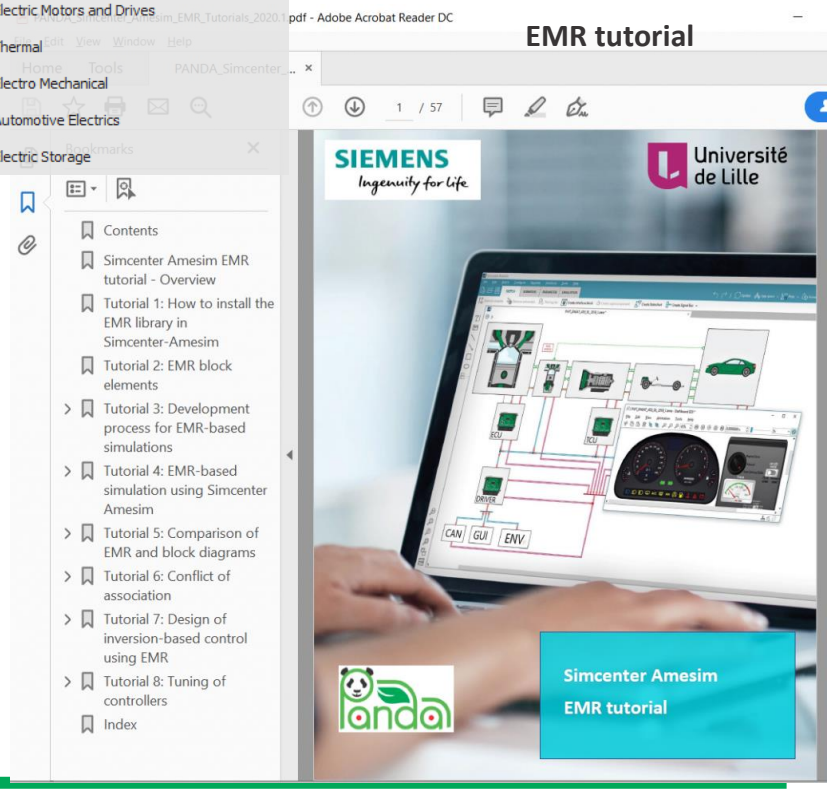
Simcenter Amesim EMR library

- New and dedicated **EMR library** where all components defined by EMR theory are included
- **Help module** with the description of each EMR element and new developed EMR tutorials included
- ***pdf tutorial** support document to facilitates the use of EMR method and library in Simcenter Amesim and guide the simulations engineers trough EMR method







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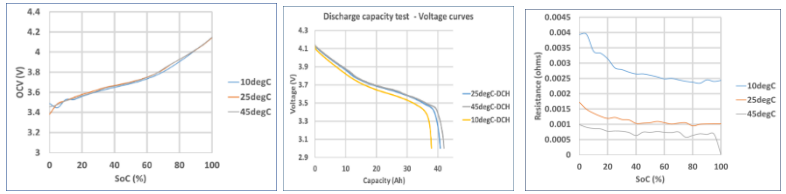
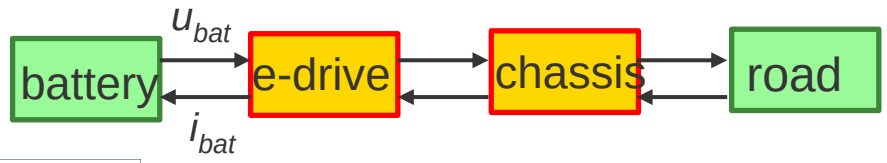
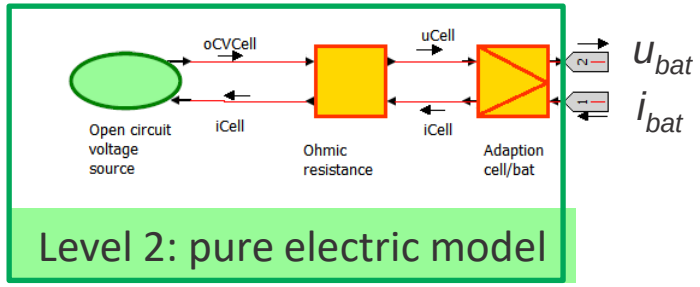
Different level of battery models

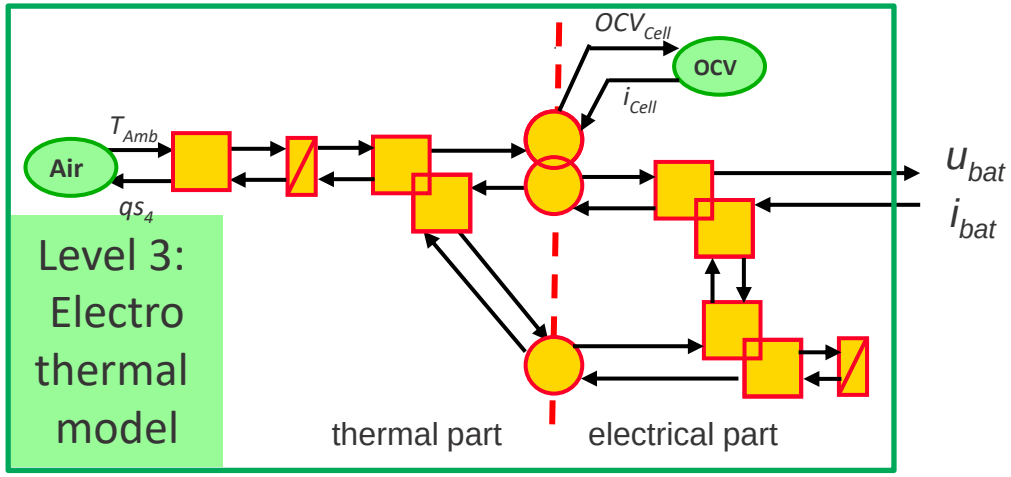
VRIJE UNIVERSITEIT BRUSSEL

Parameter identifications









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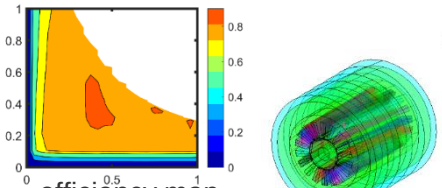
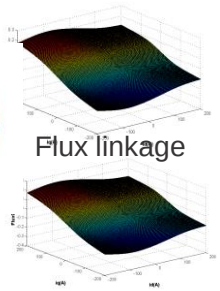
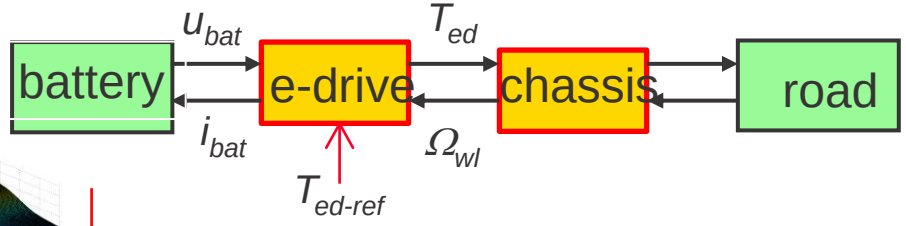
Different level of e-drive models

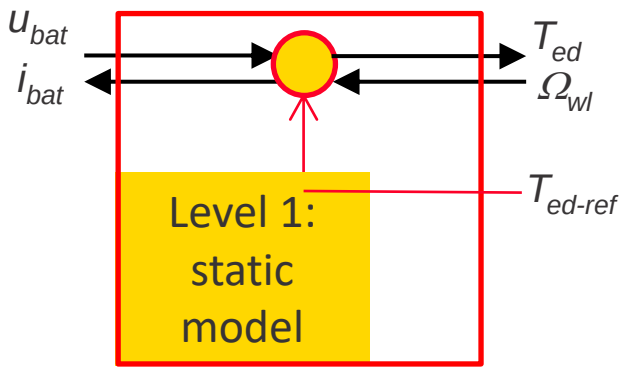
TECHNICAL UNIVERSITY OF CLUJ-NAPOCA ROMANIA

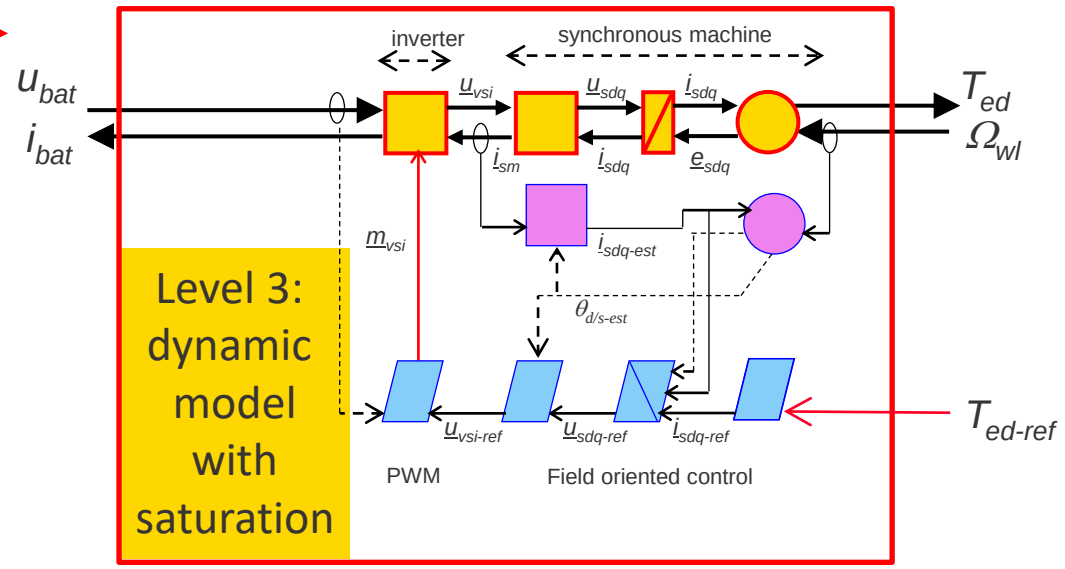
Parameter identifications





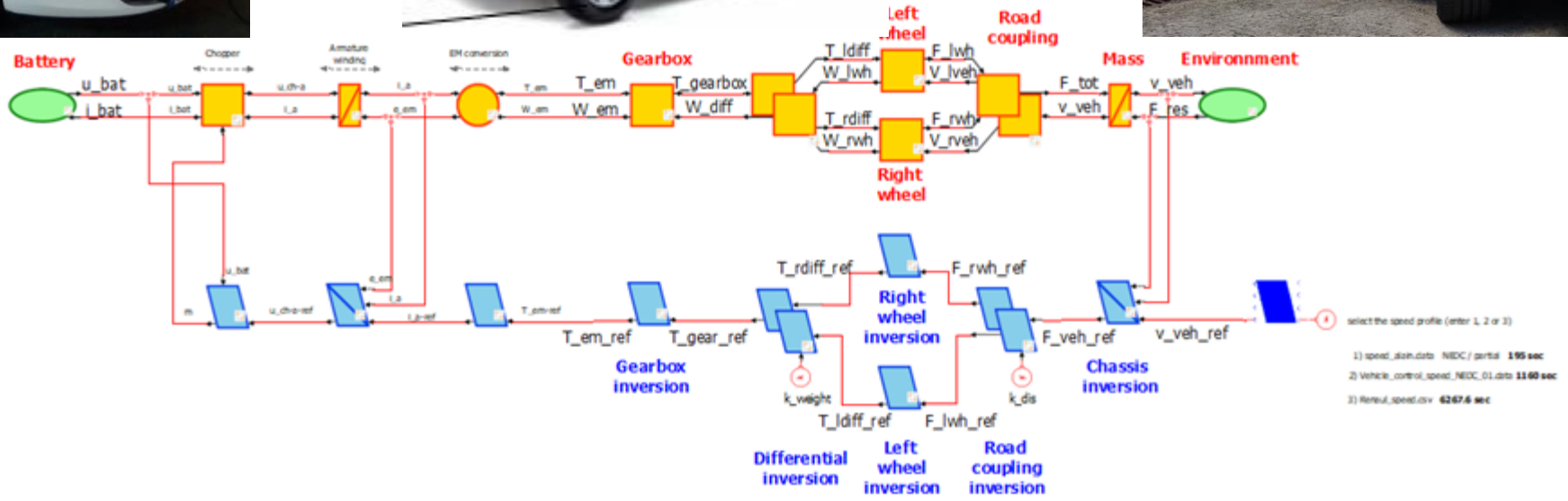






Vehicle EMR models

- Simcenter Amesim EMR n-level vehicle models based on:
  - Renault Zoe (BEV)
  - Mobypost (FCV)
  - Valeo Demo Car (P-HEV)



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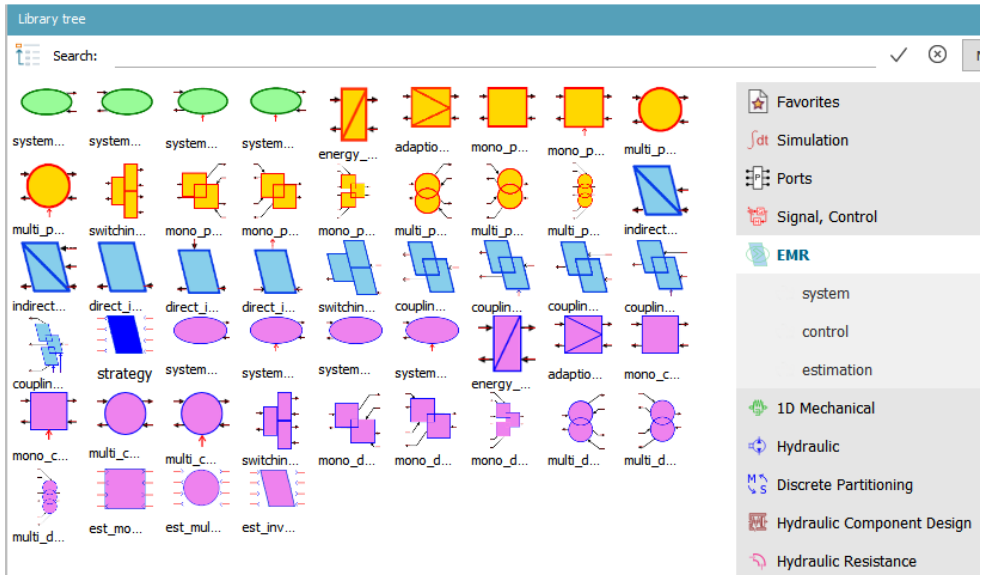
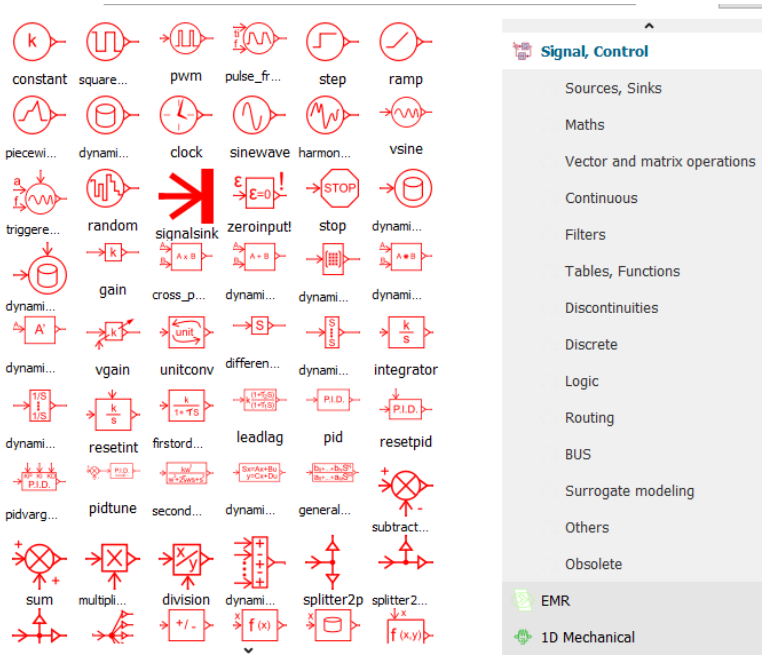
https://project-panda.eu/virtual-testing/

EMR Simulations in Simcenter Amesim

New EMR library



Signal & Control library



EMR simulations in Simcenter Amesim

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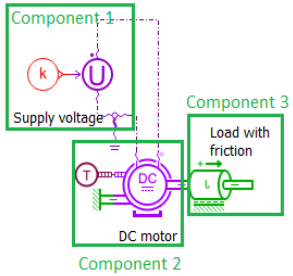
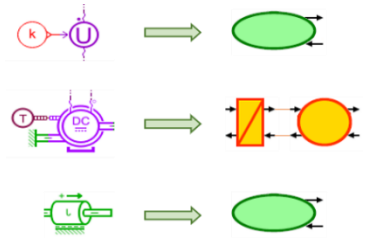
Development process for EMR simulations into Simcenter Amesim

Step 1.
Definition of the different subsystems to be considered



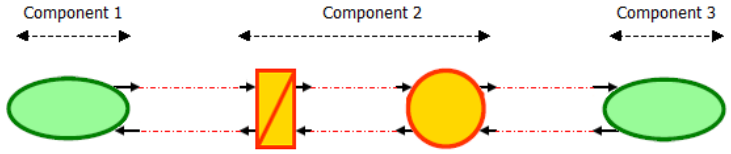
System level choice

Step 2.
Definition of the equivalent EMR elements



Component models vs. EMR elements

Step 3.
Interconnection of the EMR elements while resolving the conflict of association

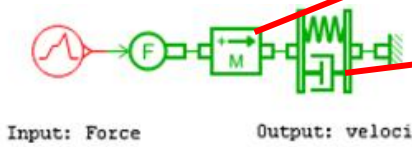


EMR diagram

Step 4.
Integration of the model equation in the EMR element using the Signal and Control library

Equation model

Structural vs. functional approach

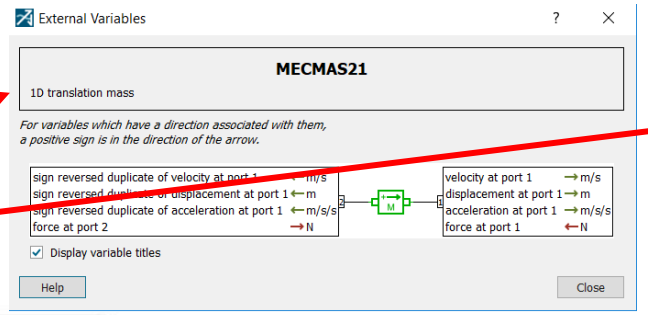


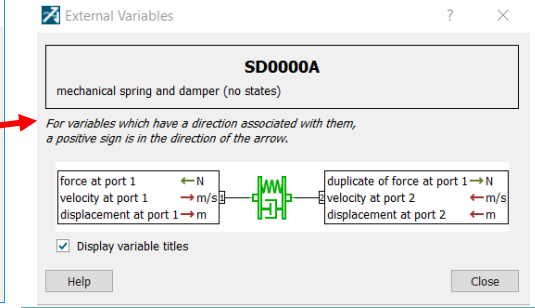
Input: Force Output: velocity

Mass = 1 kg

Spring stiffness = 100 000 N/m

Damper rating = 1000 N/(m/s)





Parameters of mass_friction_endstops [MECMAS21-1]

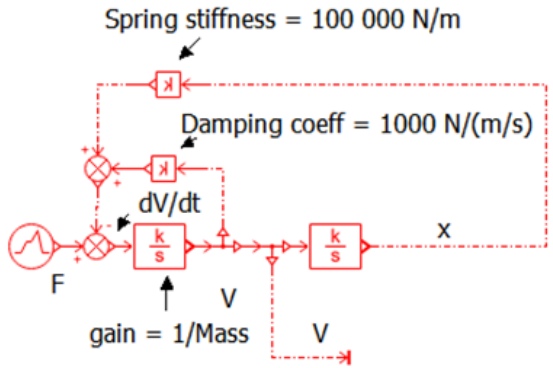
Title	Value	Unit	Tags	Name
velocity at port 1	1	m/s		v1
displacement at port 1	0	m		x1
use friction	no			useFriction
endstop type	none			stoptype
mass	100	kg		mass
inclination (+90 port 1 lowest, -90 por...	0	degree		theta

Parameters of springdamper01_1 [SD0000A-1]

Title	Value	Unit	Tags	Name
spring stiffness mode	numerical value			stiffmode
spring force with both displacements...	0	N		force0
spring rate	100000	N/m		srate
damper rating	100	N/(m/s)		cdamp

Structural representation

Functional representation



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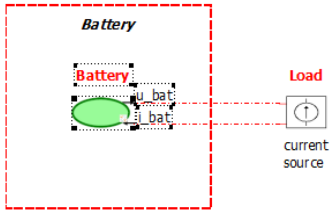
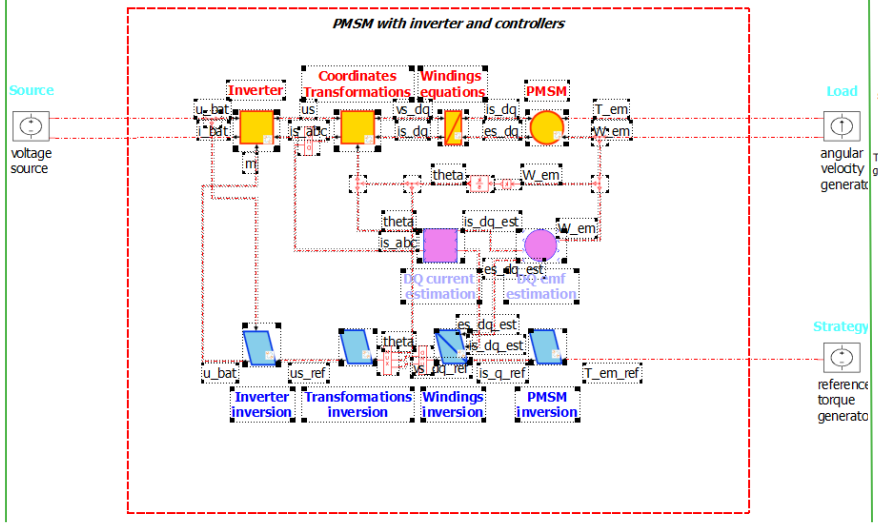
Plug & play method

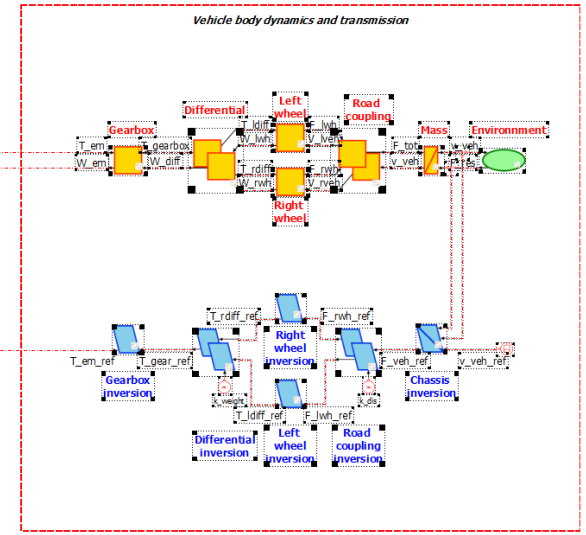
Battery – 3 levels

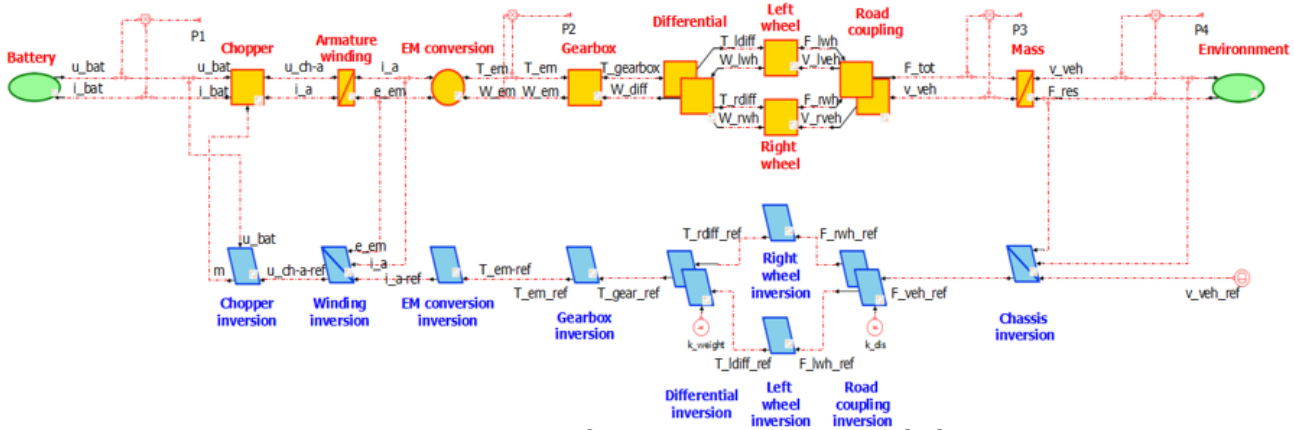


E-drive – 3 levels



Vehicle body – 2 levels





Complete BEV EMR model

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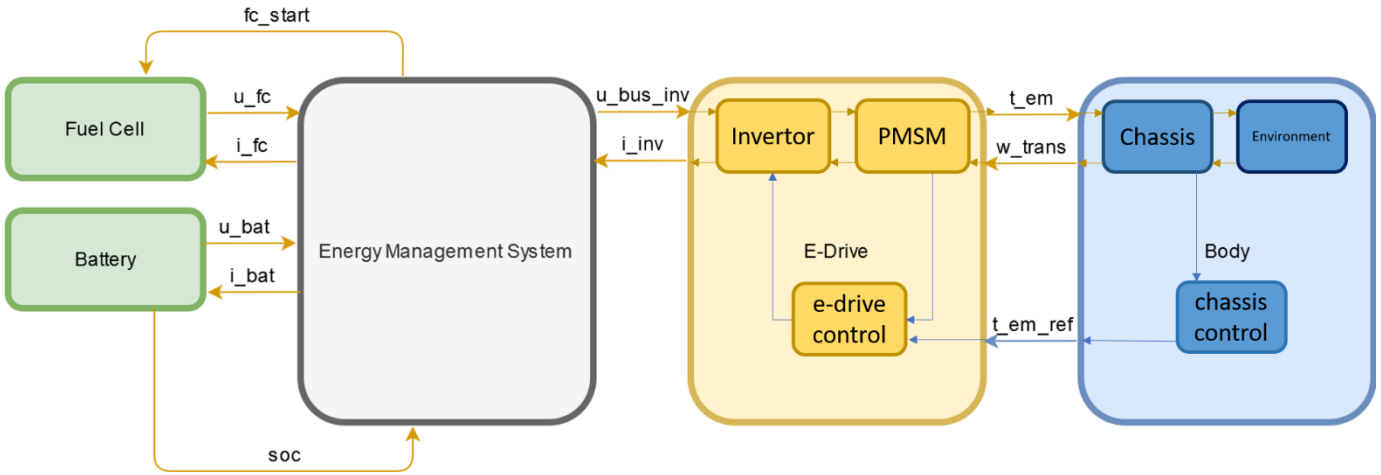
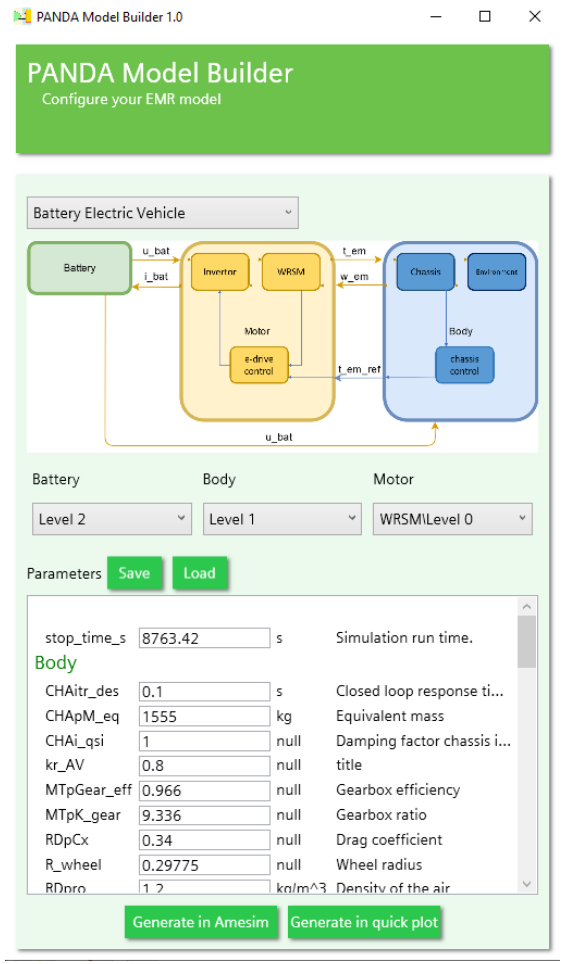
PANDA Model Builder

- Thanks to the multi-level architecture, it is possible to join components of different levels of complexity.
- To prove the plug-and-play nature of the EMR components, a tool that can generate models was developed.

- PANDA Model Builder can use an internal library of components to generate complete vehicle models.





DEMO →

Add EMR Library

Build EMR BEV starting from EMR predefined components

-Drag & drop method

-Panda Model Builder

End of presentation

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