

# Energetic Macroscopic Representation

Energetic Macroscopic Representation (EMR) is a graphical tool used to organize simulation models. EMR formalism is based on action reaction principle, which organizes the system model as interconnected subsystems according to the integral causality. An inversion of this description leads to macro-control blocks.

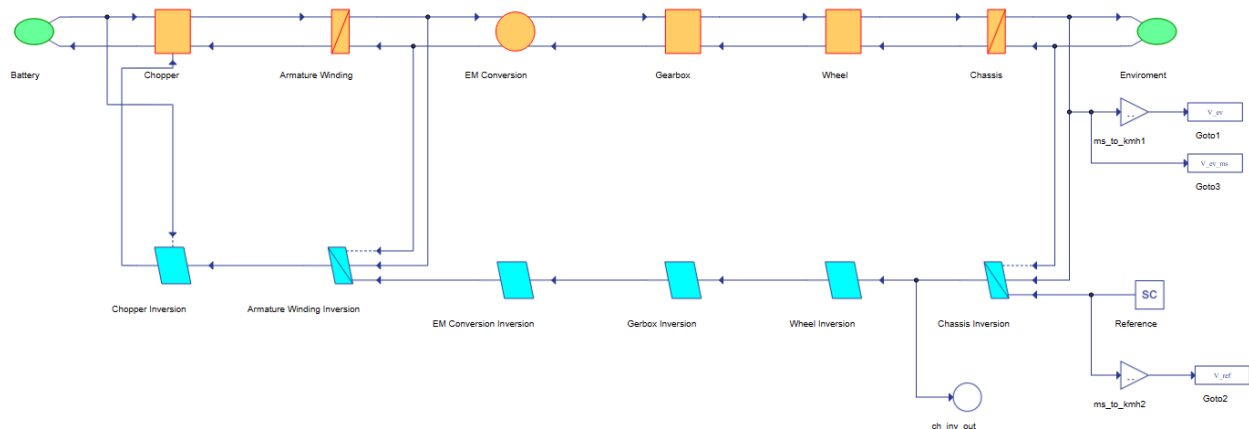
EMR formalism has been introduced for research development in complex electromechanical drives (Bouscayrol et al., 2000) [1].

Additional information about the EMR methodology and its applications can be found at the [EMR website](#) hosted by the University of Lille.

EMR library in Typhoon HIL Schematic Editor is comprised of components which implement EMR pictograms. EMR pictograms for simulation, estimation, control, and power adaptation are supported.

The components are implemented as empty subsystems.

Examples of using EMR formalism to model an electric vehicle can be found in Examples Explorer in Typhoon Control Center.



## References

- [1] A. Bouscayrol, B. Davat, B. de Fornel, B. François, J. P. Hautier, F. Meibody-Tabar, M. Pietrzak-David, [\*Multi-converter multi-machine systems: application for electromechanical drives\*] (<https://doi.org/10.1051/epjap:2000124>), EPJ Applied Physics, vol. 10, no. 2, May 2000, pp. 131-147.
- [2] A. Genic, C. Mayet, M. Almeida, A. Bouscayrol, N. Stojkov. [\*EMR-Based Signal-HIL Testing of an Electric Vehicle Control\*] (<https://doi.org/10.1109/VPPC.2017.8331047>), 2017 IEEE Vehicle Power and Propulsion Conference (VPPC), 2017, pp. 1-6