LABORATOIRE D'ELECTROTECHNIQUE ET D'ELECTRONIQUE DE PUISSANCE DE LILLE

Master project, 2016-2017

— *Modelling tools for a linear power amplifier used in Power Hardware In the Loop application* —

supervisor: Dr. Frédéric Colas, L2EP - ENSAM, Frederic.colas@ensam.eu, Ass. Prof. François Gruson, L2EP - ENSAM

Context

PUISSANCE+ is a French SME designing and manufacturing power electronic systems, specialized in linear or switching technology: generators, power supplies, loads, converters, test benches, etc. PUISSANCE+ is a leader in energy conversion and high performance power electronic. For more than 20 years, we develop AC, DC, AC+DC generation and absorption systems. PUISSANCE+ has developed solutions for energy simulation, solar energy being a priority.

One application of their converters is dedicated to Power Hardware In the loop (PHIL) applications. The objective of such application is to make an interaction between a real device and a real-time simulated one. In contrast to the usual case in hardware-in-the-loop simulation, which involves only signal exchange, PHIL simulation is a scenario where a simulation environment virtually exchanges power with real hardware.

Objective

The project deals with the development of a control algorithm for the power amplifier designed by puissance+. This control algorithm will be first tested on a model of the power amplifier and some experimental validations is planned to be done.

Work steps

1. Bibliographic study on converter's modelling and control and training on dedicated software,
2. Application to a linear amplifier developed by puissance+ (modelling and control)
3. Experimental validation on an EPMLab device.

Keywords

PHIL, Power electronics, Converter modelling.

Skills

- General knowledges in electrical engineering and power electronics
- Basic knowledge on linear power conversion
- Software : Matlab or PSIM or Scilab, Excel

references

Huerta, F., Gruber, J. K., Prodanovic, M., & Matatagui, P. (2016). Power-hardware-in-the-loop test beds: evaluation tools for grid integration of distributed energy resources. IEEE Industry Applications Magazine, 22(2), 18-26.

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Wang, Y., Delille, G., Guillaud, X., Colas, F., & François, B. (2010, July). Real-time simulation: the missing link in the design process of advanced grid equipment. In IEEE PES General Meeting (pp. 1-8). IEEE.