

Master Project/Thesis

Bachelor Thesis

Modeling of a bidirectional power converter for energy storage devices using Matlab/PLECS Blockset

Overview The interaction of the inner controllers of voltage source converters accompanied with, the resonant nature of the output filter can result in a wide resonance frequency spectrum which, can lead to instability. The aim of the project is to develop a detailed switching model of a bidirectional power converter for energy storage devices using PLECS Blockset, in order to investigate the effect of different control strategies on the harmonic characteristics of the power converter.

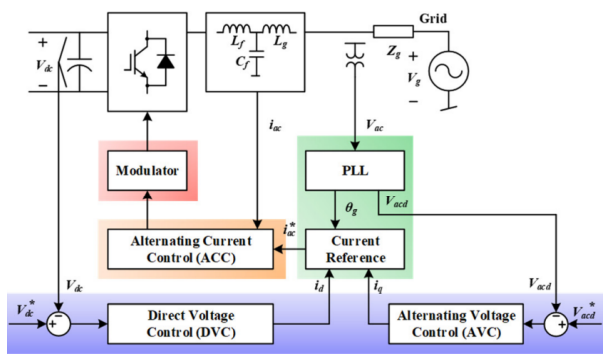


Figure 1: Generic power inverter structure[1].

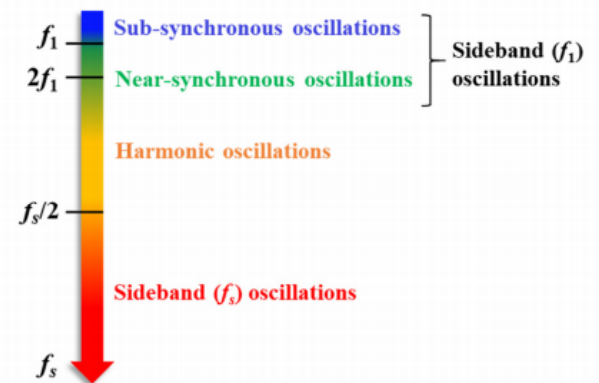


Figure 2: control loops influence on the instability frequency spectrum [1].

Tasks

- Develop a generic detailed switching model of a power inverter for a bidirectional energy storage devices using PLECS Blockset.
- Compare the results of the different controllers in term of harmonic characteristics of the voltage and current signal.

References [1] X. Wang and F. Blaabjerg, "Harmonic Stability in Power Electronic Based Power Systems: Concept, Modeling, and Analysis," in IEEE Transactions on Smart Grid.

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