

INDUSTRIAL/PHD COURSE 2018

STABILITY AND CONTROL OF GRID-CONNECTED VOLTAGE-SOURCE CONVERTERS

Agenda

Day 1 - April 16 08:30 - 16:00

- 08:30 - 12:00**
- L1 Introduction to Voltage-Source Converters (VSCs)
 - L2 Space vectors and complex transfer functions
 - L3 Small-signal modeling of VSCs
- 13:00 - 16:00**
- L4 Current control for L-filtered VSCs
 - L5 Current control for LCL-filtered VSCs
 - L6 Advanced current control: multi-frequency control, anti-windup
- Exercise I** **Design of current control for L-filtered VSCs**

Day 2 - April 17 09:00 - 16:00

- 09:00 - 12:00**
- L7 Grid synchronization: phase-locked loop
 - L8 Stability impact of grid synchronization control
 - L9 Direct voltage control and stability analysis
- 13:00 - 16:00**
- L10 Basics of grid-forming control
 - L11 Inertia emulation and current limitation
 - L12 Power synchronization control
- Exercise II** **Design of direct voltage control and phase-locked loop**

Day 3 - April 18 09:00 - 16:00

- 09:00 - 12:00**
- L13 Impedance modeling of different control loops
 - L14 Impedance based stability analysis
 - L15 Passivity-based impedance shaping technique
- 13:00 - 16:00**
- L16 Basics of impedance measurement
 - L17 Real-time impedance measurement for ac systems
 - L18 Wrap-up
- Exercise III** **Impedance-based stability analysis of VSCs**

Prerequisite: Classical feedback control theory, fundamentals of power electronics, three-phase systems

Assignments: Report for three exercises should be sent to Xiongfei Wang, xwa@et.aau.dk, by 15 May 2018.