

Advanced Modulation for Reliability-optimized Power Electronics Control

Presenter(s):

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Abstract:

Power Electronics has rapidly become the enabler for the energy transition and for the technology advancement in industrial automation, transportation and appliances.

As reliability becomes an increasingly important target, especially for applications which require low maintenance to be profitable, the advancement of the control system has made advanced control for an increasing size of the power electronics system possible.

This tutorial outlines the possibilities offered by advanced control systems, in particular of the modulation techniques, in a reliability-oriented power electronics framework. The basic concepts of reliability in power electronics and on the control of the reliability will be discussed. Particular attention will be given to the adaptive carrier phase shift modulation techniques, since they constitute a general tool that can be used to perform different kinds of optimization. Some examples include the power quality improvement of cascaded H-bridge converters operating with unbalanced power among the cells, the reduction of the capacitor current stress in interleaved dc-dc converters and the reduction of common-mode current through the electric machine bearing in an electrical drive application.

Outline schedule of delivery (headings) and expected duration

Expected duration: 3h

Theme 1: Reliability in Power Electronics

Theme 2: Active Thermal Control for Power Electronics

Theme 3: Optimized Modulations for Power Electronics Converter