Real time Intelligent Control Laboratory (RT-ICL) of PowerLabDK for smart grid technology development - DTU Orbit (16/08/2019)

This paper presents the Intelligent Control Laboratory (ICL) of the PowerLabDK and describes examples of ongoing research work utilizing the ICL. The ICL is comprised of a real time digital simulator (RTDS) with 5 racks, a full scale SCADA system and experimental control room with a link to the Bornholm power system data, an IBM blade server for optimization and control implementation, and a Phasor Measurement Unit (PMU) Lab. It is possible to interface PMUs and other hardware with the RTDS for hardware-in-the-loop (HIL) and power-hardware-in-the-loop (PHIL) tests. The ICL can interface with the Electric Laboratory through a 4-quadrant power amplifier with 150 kW continuous power supply capability, Omicron and Doble amplifiers, relays, an electric vehicle with vehicle-to-grid (V2G) capability, LabCell boards, photovoltaic (PV) panels, and micro combined heat plant (μCHP) units. The interactive simulation platform with real power system data and distributed energy resources (DER) hardware makes the ICL a very well-suited test platform for smart grid technology development and validation. The ongoing research work with the ICL illustrates the capability and feasibility of using it as a platform for smart grid technology development.

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