TRANSNATIONAL ACCESS
USER PROJECT FACT SHEET

USER PROJECT	
Acronym	CHROME
Title	Converter Harmonic Model Measurement
ERIGrid Reference	02.003-2017
TA Call No.	2nd Call

HOST RESEARCH INFRASTRUCTURE			
Name	DNVGL Netherlands B.V. – Flex Power Grid Lab		
Country	The Netherlands		
Start date	16.04.2018	**Nº of Access days**	5
End date	26.04.2018	**Nº of Stay days**	4

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1. USER PROJECT SUMMARY (objectives, set-up, methodology, approach, motivation)

The main objective of the visit was to implement impedance measurement setup capable for high-power levels (optimally up to 1 MW-range). The inverter impedance was emulated using one group HIL amplifier. This allowed testing of different impedance measurement algorithms and broadband excitation signals. During a second visit the measurement setup will be applied to characterize a commercial MW-level inverter.

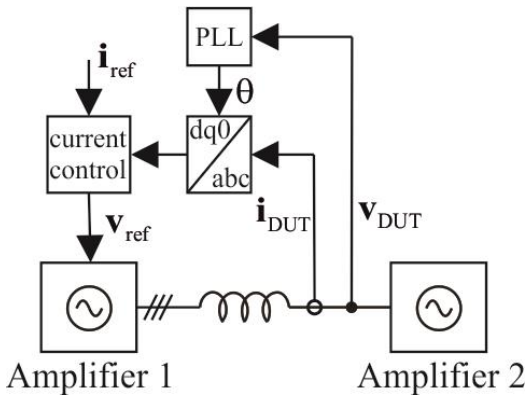

Figure 1: Measurement setup.

The main measurement setup is depicted in Figure 1. Amplifier 1 is configured to emulate inverter impedance by adding L-filter and implementing internal controllers using a real-time simulator. Amplifier 2 is used to generate a broadband excitation in order to measure the impedance.

Different excitation signals, such as MLBS, ternary and orthogonal MLBS sequences were successfully applied in impedance measurement and to verify control loop gains. Reference measurements were extracted using a frequency response analyzer based on sine-sweep.

2. MAIN ACHIEVEMENTS (results, conclusions, lessons learned)

The lessons learnt provide good background for implementation of the MW-level inverter impedance measurement during the planned second visit. Figure 2 shows measured impedances, where different measurement algorithms are compared. The setup can be further used to optimize the impedance measurement algorithm.

Moreover, it was found out that the developed setup can be used to emulate impedance behavior of a real inverter up to the bandwidth of the internal current control (implemented using real-time simulator). This may be of interest in future studies related to power-electronics-based power systems and microgrids with multiple power electronics converters.

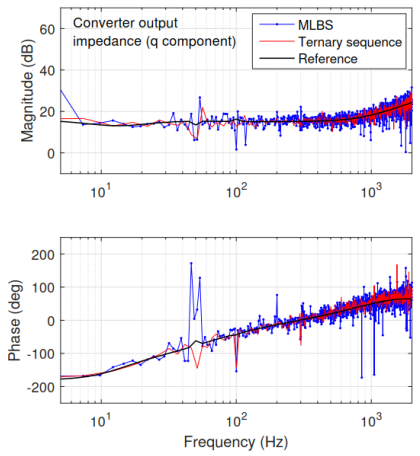

Figure 2: Identified impedance.

3. PLANNED DISSEMINATION OF RESULTS (journals, conferences, others)

One journal article has been submitted for review in IEEE Trans. on Industrial Electronics, two publications are in preparation to IEEE Trans. on Power Electronics and Energies (open-access).