



ELECTRA REX

A Researcher Exchange Programme for Smart Grids

European Liaison on Electricity Committed Towards long-term Research Activity Integrated Research Programme

MODELING OF ACTIVE NETWORKS AND SMART GRIDS - MANAGE

E. O. Kontis*, T. A. Papadopoulos**, G. M. Burt*** and
G. K. Papagiannis*

* Power Systems Laboratory, School of Electrical and Computer Engineering, Aristotle University of Thessaloniki, Thessaloniki, GR-54124, Greece

** Power Systems Laboratory, Department of Electrical and Computer Engineering, Democritus University of Thrace, Xanthi, GR-67100, Greece

*** Department of Electronic and Electrical Engineering, Institute for Energy and Environment, University of Strathclyde, Glasgow, UK

The scope of this exchange was twofold. First of all, to evaluate the performance of the equivalent dynamic load model, proposed in [1], for the simulation of conventional passive distribution grids using real measurements. Secondly, to extend the formulation of the proposed model in order to facilitate the simulation of modern active distribution networks (ADNs).

During the exchange period, eighteen distinct network topologies were emulated using the existing laboratory equipment. Different load and generation compositions, loading conditions and voltage disturbances were examined. Moreover, power hardware in the loop (PHIL) simulations were also conducted using the existing RTDS unit and the hardware of the laboratory.



Fig. 1. PHIL simulations during the exchange.

The dynamic responses, obtained from the above-mentioned sets of experiments will be used to evaluate the applicability of the developed equivalent model as well as to demonstrate its performance against other conventional equivalent models [2]. Preliminary results of the work performed during this exchange will be presented in the Innovative Smart Grid Technologies (ISGT - 2017) conference.

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REFERENCES

- [1] E. O. Kontis, T. A. Papadopoulos, A. I. Chrysochos, and G. K. Papagiannis, Modeling of Nonlinear Dynamic Power System Loads Using the Vector Fitting Technique, Journal of Power Sources, 51th International Universities Power Engineering Conference (UPEC), Coimbra, Portugal, Sept. 6 – 9, 2016.
- [2] Bibliography on load models for power flow and dynamic performance simulations, IEEE Transactions on Power Systems, vol. 10, no. 1, pp. 523-538, Feb. 1995.