COPPE/UFRJ and KTH SmarTS Lab:

Collaborating for Smarter Electrical Power Grids!

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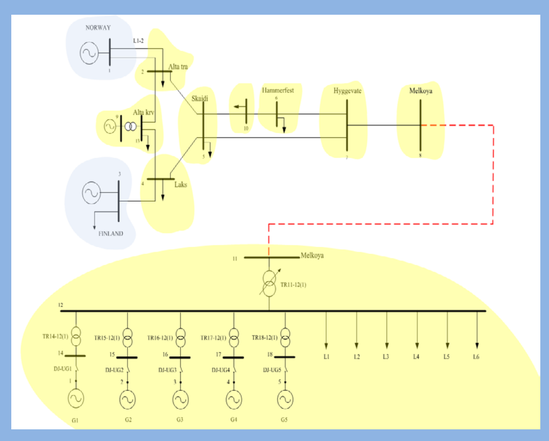
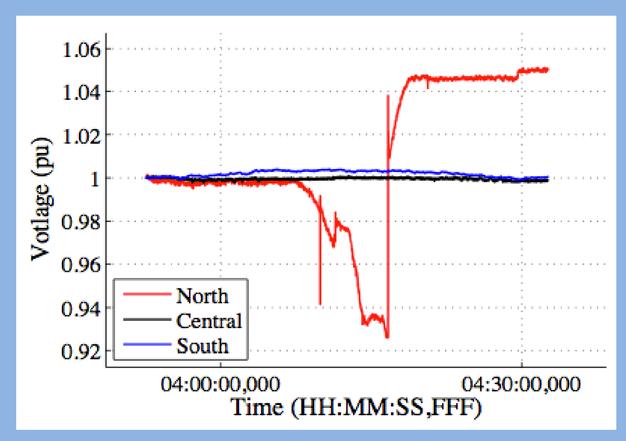
Introduction

Electrical power systems are a critical infratstructure for society. As a result of the challenges of more electrification and more renewable energy sources, new smart methods for operation and control are being researched to ensure that electrical energy is distributed in an efficient and reliable manner.

Through STINT/CAPES funding, the Federal University of Rio de Janeiro (UFRJ) in Brazil and the Royal Institute of Technology in Sweden have been collaborating since 2012 in the fields of voltage stability, a condition for the transmission of electrical energy, and in the field of PMUs, a type of device giving fast and accurate measurements of the state of the system, which can be used to develop better methods to tackle different stability and operating problems.





Workshops in Brazil and in Sweden

Resiliency for power networks of the future was organized at KTH, 2015, as a one-day workshop on with invited speakers from Brazil, USA, Sweden and Norway. As experts in the field of power systems they gave several talks related to the topic as well as participating in panel discussions.

The I, II and III International Workshop on the Use of Synchrophasors in Power Systems were organized at UFRJ, 2012, 2013 and 2014, respectively, with upwards to 80 participants at each instance. The workshops featured speakers from both academia and the power industry of Brazil as well as international researchers.

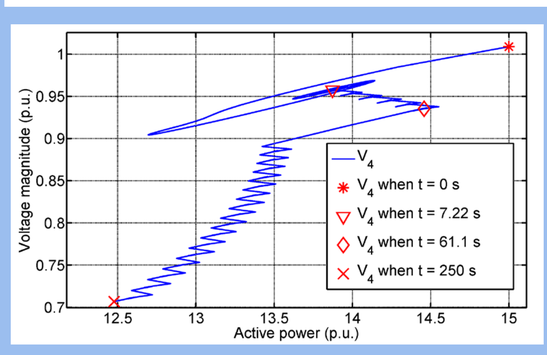
Collaborative Research

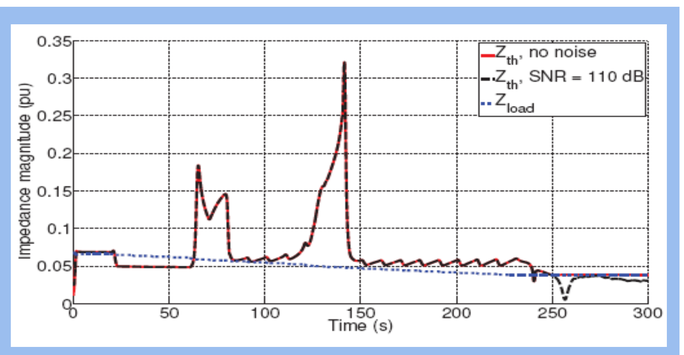
The research activities have been centered around voltage stability detection algorithms, a topic which both parties have an interest in, and is a which prof. Taranto of UFRJ has made significant contributions to.

The collaboration has resulted in a collection of power system models that were developed in order to study and benchmark voltage instability detection schemes.

Furthermore a novel voltage instability detection method was developed in this project and the resulting paper presented at an international conference on Electrical Engineering in Rome, EEEIC 2015.

Planning and development of a real-time simulation and PMU lab at COPPE/UFRJ was carried out with the assistance of Prof. Vanfretti during several visits to Brazil.



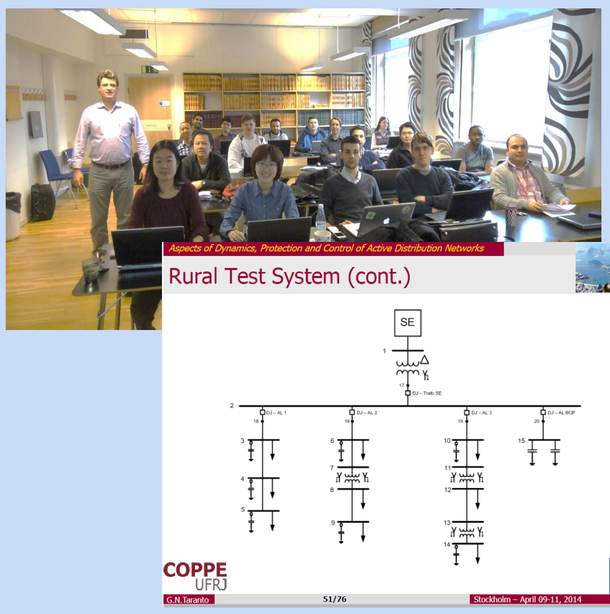


J. Lavenius, L. Vanfretti and G. N. Taranto, "Performance assessment of PMU-based estimation Methods of Thevenin Equivalents for real-time voltage stability monitoring," *Environment and Electrical Engineering (EEEIC), 2015 IEEE 15th International Conference on*, Rome, 2015, pp. 1977-1982.

University Courses

Several courses has been arranged as a part of the collaboration where Brazilian professors have delivered lectures on power system stability and protection as well as power simulation software (Simulight). The students have come from several different Nordic and European countries from master and doctoral programs as well as attendees from the power industry.

- “Power System Dynamics and Controls”, taught in 2013 at KTH.
- “Aspects of Dynamics, Protection and Control of Active Distribution Networks”, taught in 2014 at KTH.
- “Linear Stability Analysis of Multi-machine Power Systems”, “Classical Control for Power Systems” and “Power System Protection: an Overview taught in 2015 at KTH.



Financed by:

STINT
Stiftelsen för internationalisering av högre utbildning och forskning
The Swedish Foundation for International Cooperation in Research and Higher Education

CAPES

KTH ROYAL INSTITUTE OF TECHNOLOGY

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