Tessitore Salvatore

Innovative measurement solutions based on 4.0 technologies for electricity transmission networks

Tutor:
Prof. Angrisani Leopoldo

Co-Tutors:
Prof.ssa Liccardo Annalisa
Ing. Giannuzzi Giorgio Maria (Terna spa)

Cycle: XXXV

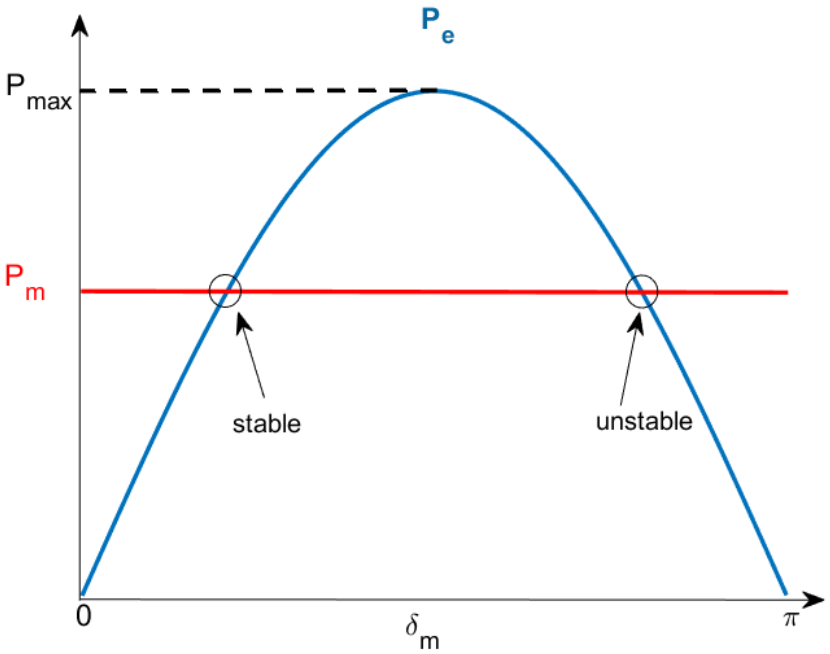
Year: Second

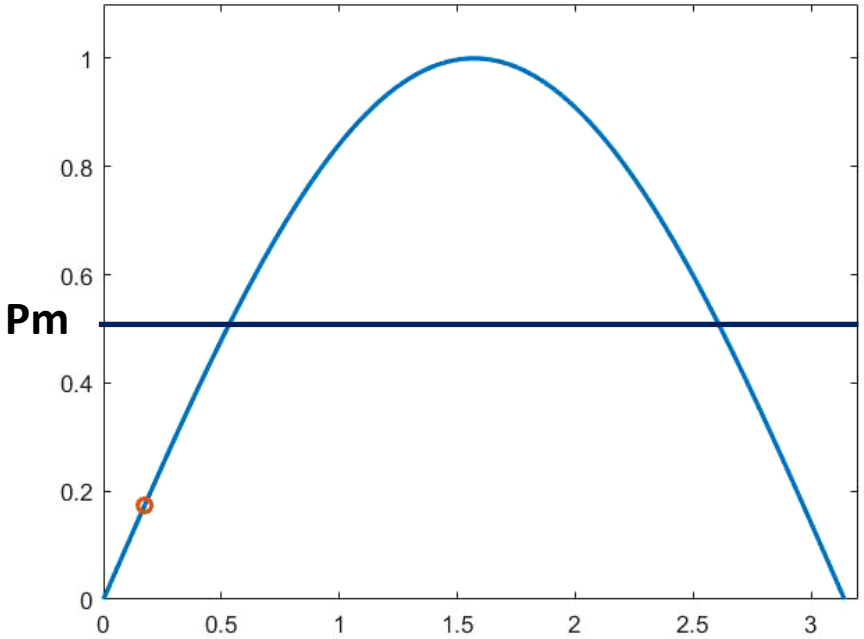
My background

- MSc degree: Electrical Engineering
- Research group: Electrical and Electronic Measurements
- PhD start date: 01/11/2019
- Scholarship type: No Scholarship
- Partner company: Terna S.p.a

Research activity: Overview

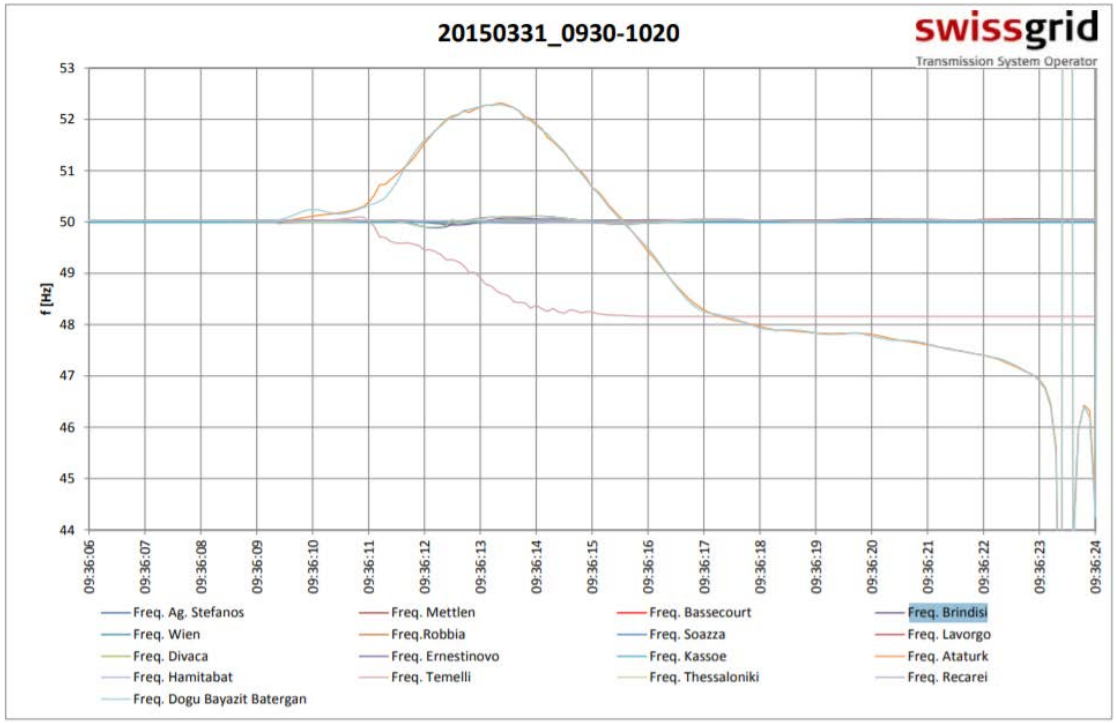
- My research area is the Measurement of Power System Stability



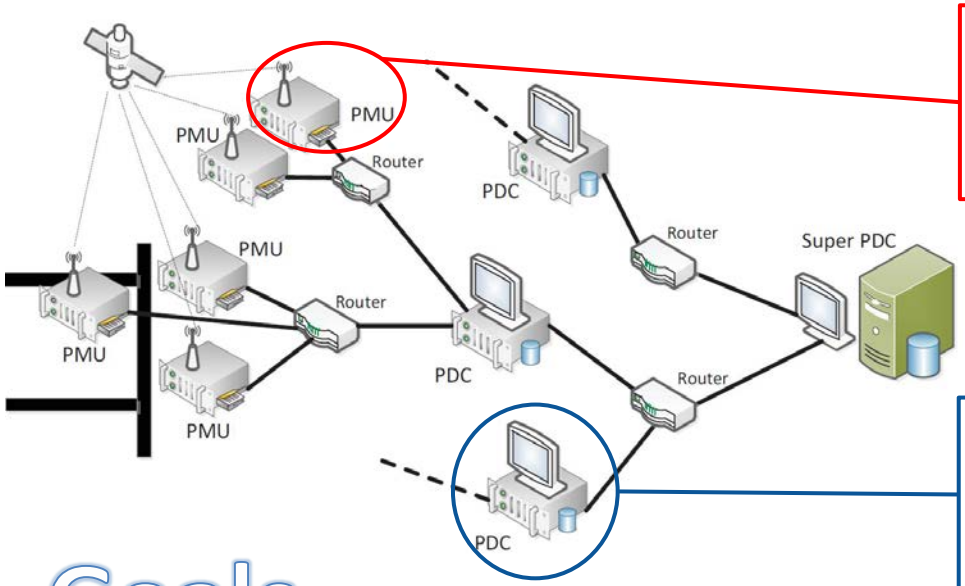


Research activity: Problem

- The system frequency varies linearly with the speed of the generators connected to the grid



Research activity: Objectives



PMU (Phasor Measurement Units), Data acquisition device that uses the GPS system to perform synchronized measurements.

WAMS System

PDC (Phasor Data Concentrator), collector of data from PMUs by creating a single synchronized data output stream.

Goals

- Obtain data from different strategic points of the Italian transmission network
- Evaluation of the parameters of interest for the analysis, both dynamic and static, offline and online
- Possibility of comparing data coming from different areas of the network on the basis of a common temporal reference, since the acquisitions take place in a synchronized way.

Research activity: Objectives

WAMS APPLICATIONS

ONLINE APPLICATIONS

- Interarea oscillation monitoring
- Monitoring of active and reactive power flows and phase angles
- Frequency monitoring
- Check voltage levels
- Thermal monitoring of transmission lines

OFFLINE APPLICATIONS

- Post-disorder analysis
- Benchmarking, validation and fine-tuning of system models.

Research activity: Methodology

BENCHMARK STRUCTURE

PMU simulated with data reading from CSV files

openECA Software

openECA Manager

openECA Client

Project implemented in Matlab

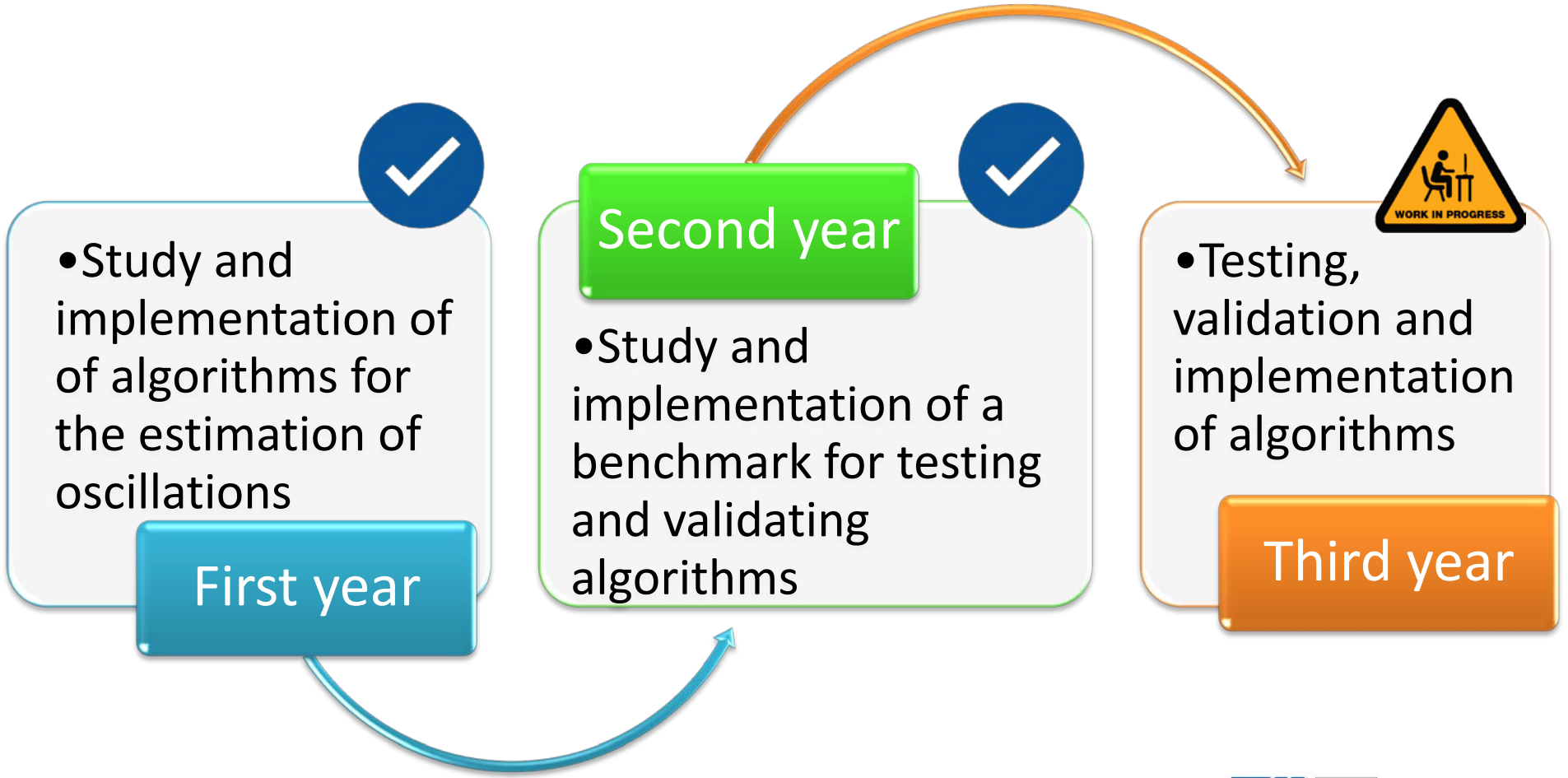
- Reading of measured frequencies from CSV files
- Configuration via Matlab app
- Data transmission in accordance with the **IEEE C37.118.2-2011 Standard** (Standard for Synchrophasor Data Transfer for Power Systems)

Products

[P1]	*A WAMS emulation framework for the characterization of measurement algorithms on electrical transmission networks; 2021 IEEE International Workshop on Metrology for Industry 4.0 and IoT, MetroInd 4.0 and IoT 2021, Virtual Online, 7 June 2021 through 9 June 2021*

Conclusion

MEASUREMENT OF POWER SYSTEM STABILITY



Summary of study activities

	Courses	Seminars	Research	Tutorship	Total
Bimonth 1	0	0	5	0	5
Bimonth 2	6	0	5	0	11
Bimonth 3	4	2.3	10	0	16.3
Bimonth 4	0	5.1	5	0	10.1
Bimonth 5	0	0.8	10	0	10.8
Bimonth 6	3	0	10	0	13
Total	13	8.2	45	0	66.2
Expected	20 - 40	5 - 10	10 - 35	0 - 1.6	

THANK YOU FOR YOUR ATTENTION