



IPST2023

International Conference on Power Systems Transients
THESSALONIKI | 12-15.06.2023

Workshop on Grid forming control and EMT Studies

June 11th, 2023 between 13.00 and 17.15

Keywords

FACTS, EMT-type tools, HV power electronics, HVDC links, Interactions phenomena, VSC station, wind power plants, solar plants, Battery Storage systems (BESS)

Context

The decarbonization target has been one of the greatest challenges of our time. To meet up with the increasing demand and simultaneously achieving carbon neutrality, has led to network expansion with significant renewables sources like solar and wind. Primarily, the source of such energy is restricted to certain region due to resource availability, which imposes requirement of long interconnectors either AC or DC to transmit the energy to the consumers, including certain cases creating new cities or renewable areas completely decoupled from the existing AC grids. Thus, careful planning is required on designing the grid and additional requirements are imposed to these power electronics converters to provide system stability features such as Grid Forming.

Grid-forming control is a type of control strategy used in power systems that allows distributed energy resources (DERs) such as solar panels, wind turbines, energy storage systems, but also HVDC converters, to operate in a way that emulates the behavior of traditional synchronous generators. Traditionally, synchronous generators have been the primary source of power in power systems. Their behavior has been well understood and standard models have been established. However, with the increasing prevalence of DERs, the behavior of the power system has become more complex and less predictable.

Grid-forming control aims to address this issue by allowing DERs to emulate the behavior of synchronous generators, which provides greater stability and predictability to the power system. This is achieved by controlling the voltage and frequency of the power output of the DERs, which allows them to contribute to the overall stability of the grid. Overall, grid-forming control is an important development in the integration of DERs into power systems, as it helps to ensure the stability and reliability of the grid, while also allowing for greater flexibility and resilience. The purpose of the control is to achieve a wide range of operation – from operating in parallel to synchronous generation in traditional grid to a complete renewable or isolated grid with loads.



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While grid-forming control is an important strategy for integrating distributed energy resources (DERs) and HVDC into power systems, there are several issues that can arise in the implementation of this control strategy and that can lead to adverse interaction. Some of the typical issues with grid-forming control are:

- Control performance
- Coordination with other control strategies (Grid Following, different type of grid forming assets nearby such as BESS ...)
- Grid disturbances
- Adverse interactions
- Modelling accuracy

Overall, grid-forming control is a complex and challenging control strategy that requires careful planning, coordination, and implementation to ensure the stability and reliability of the power system. The objectives of the workshop are:

- **Knowledge sharing:** participants will be able to gain a better understanding of the challenges and opportunities of the Grid Forming control strategy; including planning aspects of a 100% renewable based grid and impact on asset requirements
- **Best practices and case studies:** best practices and case studies of successful grid-forming control implementations in different regions and contexts will be presented. This will provide participants with practical insights and lessons learned that they can apply in their own projects.
- **Technical training:** The workshop will provide technical training on the design, modeling, and implementation of grid-forming control for engineers, system operators, and other technical professionals. This will help participants to develop the skills and knowledge required to implement this control strategy effectively especially in EMT tools.

Organization

This workshop is organized by RTE international and Siemens Energy in conjunction with the IPST Conference

Registration

The workshop is open to all, free of charge, upon registration. To register please contact:

Sébastien Denetière (RTE international) : sebastien.dennetiere@rte-international.com

or

S M Iftekharul Huq (SIEMENS Energy): s_m_iftekharul.huq@siemens-energy.com



Preliminary Agenda

Entity	Time	Presenter	Title
RTEi / SIEMENS	13.00	S.Dennetière S M Iftekharul Huq	Welcome and introduction
NEOM	13.20 - 13.40	Grain Adam	Grid Forming HVDC's in Renewable City of NEOM
SPR	13.40 – 14.00	Spyros Karamistos	Grid Forming in offshore applications
RTE international	14.00 - 14.20	Viktor Rudan	Experience of performing grid forming tests using BESS
Mosaic Grid Solutions	14.20 – 14.40	Max Goertz	Benchmark of grid-forming requirements using EMT-studies – from behavior of single assets to system studies comprising many converters
OPAL-RT / Fraunhofer	14.40 – 15.00	Axel Seibel Ron Brandl	Distributed Grid-Forming Control - Development, Testing and Validation Using HiL/PHIL
15.00 – 15.30		Coffee Break	
SIEMENS	15.30 – 15.50	S M Iftekharul Huq	Interaction of different Grid Forming assets in EMT tool and necessity of reflective real control modelling
EMTP	15.50 – 16.10	Jean Mahseredjian	Modeling and Simulation of Grid Forming Converters in EMTP
ACDC Transients	16.10 – 16.30	Hani Saad	EMT studies for future offshore applications: HVDCs, Hydrogens and Wind Farms
Universitat Politècnica de Catalunya (CITCEA-UPC)	16.30 – 16.50	Vinícius Albernaz Lacerda Freitas	Challenges and Simulation Guidelines of EMT simulation of Grid-forming converters During Short-circuit Events
RTE	16.50 – 17.10	Pierre Rault	Opportunity and challenges of grid forming for HVDC links between asynchronous grids
All	17h15	Conclusion and wrap-up	