

2018

Entity: Power System Dynamic Performance Committee (PSDPC)

Chair: Claudio Cañizares, University of Waterloo, Canada

Vice-Chair: Costas Vournas, NTUA, Greece

Secretary: Leonardo Lima, Kestrel Power Engineering, US

1. Significant Accomplishments:

1.1. Task Forces / Working Groups:

PSPDC Working Groups (WGs) and Task Forces (TFs) have been very active and successful during 2018. Thus, the TFs that successfully completed their work resulting in published PES Technical Reports/papers were:

- TF on Microgrid Stability Analysis and Modeling published its final report (Technical Report PES-TR-66), submitted a Transactions paper and is now formally disbanded.
- TF on Test Systems for Voltage Stability and Security Assessment continues working on a summary paper to submit to the IEEE Transactions on Power Systems.
- TF on Contribution to Bulk System Control and Stability by Distributed Energy Resources Connected at Distribution Networks organized a very successful webinar on its report (Technical Report PES-TR-22).

The following TFs were established:

- The TF on Modeling of Large Interconnected Systems for Stability Analysis, chaired by L. Lima was replaced by a new TF on Modeling and Simulation of Large Power Systems with High Penetration of Inverter-Based Generation Chaired by Antonello Monti, RWTH, Germany with Ryan Quint, NERC, USA as Vice-Chair and Deepak Ramasubramanian, EPRI, USA as Secretary.
- A new TF on Microgrid Dynamic Modeling chaired by C. Cañizares.

1.2. Panels Sessions

At each PES GM, the Committee actively sponsors at least 5 panel sessions, as per its maximum TC allocation. All have been highly attended and successful sessions on relevant industry and research issues in the area of power system dynamics. The following Committee-sponsored panel sessions were successfully presented at the 2018 GM:

- Real-time Voltage Control and Stability Monitoring
- Finding the Sources of Sustained Oscillations – From Theory to Industry Practice
- Impact of the Use of Node-Breaker Representation in Power Flow and Transient Stability Analysis Software on Dynamic Performance (the panel was repeated due to the overwhelming attendance during 2017 GM)
- New Control Functionalities of Inverter-Coupled Distributed Generation to Support Stability in Power System Restoration

- Modelling of Inverter-Based Generators in Transmission and Distribution Dynamic Studies

The following 5 panel sessions are planned for the 2019 GM:

- Experiences and insights on the use of the generic Distributed Energy Resource model (DER) in transient stability simulations
- Local Frequency Measurements for System Control
- Microgrid Stability Definitions, Analysis, and Modeling
- Handling Uncertainties and Use of Equivalents in Dynamic Security Assessment
- System Wide dynamic model validation

In addition, the committee will co-sponsor the following panel with CAMS Committee:

- Power System Resilience

1.3. Tutorials

The PSDPC has in recent years sponsored several successful tutorials. The following tutorial was sponsored by the PSDPC during the 2018 GM:

- Dynamic Modeling of Offshore Wind Farms for Transient and Dynamic Analysis and Control System Design

The following 2 tutorials were proposed for the 2019 GM:

- Advanced Pumped Storage Hydropower Plants
- Integrated Modeling and Simulation of Transmission, Distribution, and Communication (TDC) Systems

2. Benefits to Industry and PES Members from the Committee Work:

The benefits of the work of the PSDPC to the power and energy industry are as follows:

- Fostering high quality technical work in the area of power system dynamic performance and reporting on this work in the form of public IEEE Technical Reports (available on the PES Resource Center) and other avenues (such as journal and conference papers).
- Consistently organizing relevant panel sessions describing practical experiences and technical tools related to power system stability, control, and modeling, which address the latest industry initiatives and challenges.
- Providing an open forum for interaction among representatives of manufacturers, vendors, academia, and research institutions to raise, address, and resolve current technical issues facing the power industry related to power system dynamic performance.

3. Benefits to Volunteer Participants from the Committee Work:

The benefits to the PSDPC participants are as follows:

- The Committee actively seeks the active participation of its members in its different activities with the goal of promoting and enhancing their professional development. Examples include: (a)

encouraging members to participate in different committee activities; (b) promoting and organizing panel sessions of interest to PSDPC members; (c) imposing term limits (2 years) on committee officers and on subcommittee (SC) and WG Chairs (4 years) in order to allow for continuous renewal and involvement by the membership in the committee's leadership; and (d) maintaining a balance between members from industry and academia, as well as between members from North America and outside North America, who serve in the committee and subcommittee leadership positions, to ensure diversity and global representation to the extent possible.

- The Committee provides a forum through Panel Sessions, Special Technical Sessions, and presentation opportunities within its Committee/SC/WG/TF meetings to disseminate the latest important technical issues of interest to industry participants and researchers.
- Participants in the various activities of the PSDPC have the opportunity of establishing contacts with leading international experts in power system dynamic performance.

4. Recognition of Outstanding Performance:

The following PSDPC members were recognized in 2018 for their outstanding achievements:

PES and External Awards:

- Vijay Vittal was awarded the 2018 IEEE PES Prabha S. Kundur Power System Dynamics and Control Award.
- Carson Taylor was awarded the 2018 IEEE PES Charles Concordia Power System Engineering Award.
- Leonardo Lima was awarded the 2018 PSDPC and Technical Council Distinguished Service Award.
- The 2018 Outstanding Technical Report Award (by both PSDPC and PES) was presented to the TF report on Contribution to Bulk System Control and Stability by Distributed Energy Resources connected at Distribution Networks.
- PES best Transactions paper award in 2018 and 2018 Technical Committee Prize Paper Award was presented to "A Dynamic Mode Decomposition Framework for Global Power System Oscillation Analysis" by Emilio Barocio, Bikash C. Pal, Nina F. Thornhill, Arturo Roman Messina, published in IEEE Trans. On Power Systems, Volume: 30, Issue: 6.

PSDPC Awards:

Recognition Awards were presented to:

- Udaya Annakkage, for his excellent work as PSDP Committee's Technical Committee Program Chair
- Howard Illian for his excellent work and leadership as Chair of the Task Force on Measurements, Monitoring, and Reliability Issues Related to Primary Governor Frequency Response
- Pouyan Pourbeik for his outstanding work and leadership as Chair of the Working Group on Dynamic Performance of Renewable Energy Systems

5. Coordination with Other Entities (PES Committees, CIGRE, standards, etc.):

The PSDPC coordinates with the CIGRE Study Committee C4 – System Technical Performance, in areas of mutual interest, and has hosted over the past decade numerous meetings of CIGRE Working Group meetings on the Sunday of the IEEE PES General Meeting. These areas included modeling of combined-cycle power plant, modeling of wind turbine generators, wide-area control and measurement, on-line dynamic security assessment, dynamic state estimations, load modeling, and application of phasor measurement units in monitoring and control of system dynamic performance. In 2018, we again hosted CIGRE WG meetings on the Sunday of the PES GM.

Many of the members of these CIGRE WGs have also actively participated in and contributed to our Panel Sessions, WGs, TFs, and many committee and subcommittee activities, resulting in mutually beneficial exchange of areas between the two profession societies. Furthermore, in the past and presently, officers of the PSDPC also have served as CIGRE Study Committee Chairs.

The PSDPC is also closely working with the Power System Relaying and Control (PSRC) Committee, as in the past, on many activities of mutual interest and there are standing liaisons between the two committees. In 2018, PSDPC members have participated and contributed to the PSRC Committee WG J13 “Modeling of Generator Controls for Coordinating Generator Relays” work and associated report.

6. New Technologies of Interest to the Committee:

The following is a list of some of the new technologies that are of interest to the PSDPC and are a part of the topics covered by many of our Panel Sessions, WGs and TFs:

- Wind and solar power plants.
- Microgrids.
- Dynamic performance of HVDC transmission.
- Application of synchrophasor measurements to dynamic monitoring and control.
- Application of high performance computing to dynamic security assessment.
- Impact and contribution of distributed energy sources, connected to distribution grids, to overall system dynamics, stability, and security.
- Dynamics, stability, and control of power systems with high penetration of variable renewable generation.

8. Significant Plans for the Next Period:

Continue to maintain the high quality and output of our TFs and WGs, and continue to increase the attractiveness of the various PSDPC activities to industry. Presently, there are 5 Panel Sessions planned by the committee for the 2019 GM, as previously mentioned.



Submitted by: **Costas Vournas, Chair**
 Leonardo Lima, Vice-Chair
 Bikash Pal, Secretary
 Claudio Canizares, Past Chair

Date: January 8, 2019