

2020

Entity: Power System Dynamic Performance Committee (PSDPC)

Chair: Costas Vournas, NTUA, Greece

Vice-Chair: Leonardo Lima, Kestrel Power Engineering, US

Secretary: Bikash Pal, Imperial College, UK

1. Significant Accomplishments:

1.1. Task Forces / Working Groups:

All PSDPC Working Groups (WGs) and Task Forces (TFs) have been very active and successful during 2020. The following TF that successfully completed its work resulting in published PES Technical Report has published also a Power Systems Transactions paper (IEEE Trans. on Power Systems, Sept. 2020, pp. 4078-4087):

- TF on Test Systems for Voltage Stability and Security Assessment

Also, the following TF completed its work by publishing the Technical Report PES-TR77, May 2020 and also had a paper accepted in IEEE Transaction on Power Systems and is organizing a webinar in early 2021:

- Task Force on Stability definitions and characterization of dynamic behavior in systems with high penetration of power electronic interfaced technologies

1.2. Panels Sessions

At each PES GM, the Committee actively sponsors at least five 4h panel sessions, as per its maximum allocation. This year the GM was virtual so the panel sessions were recorded and made available for viewing by the GM attendees. The following 5 Committee-sponsored panel sessions were successfully presented at the 2020 GM:

- Impact of uncertainties on dynamic security assessment, Chaired by Martin Wolter and Henry Huang
- Control Approaches of Inverters in Restorative States Chaired by Martin Braun
- Synchronized Point-on-wave measurements: Technology, Requirements, and Applications, Chaired by Mani Venkatasubramanian and Jeff Dagle
- Modelling and Simulation of Large Power Systems with high Penetration of Inverter-based Generation, Chaired by Antonello Monti
- Utilizing distribution system assets and DER for transmission system voltage stability, Chaired by Anurag Srivastava and Venkataramana Ajjarapu
- Bulk Power System Oscillations – Identification, Location, and Mitigation, Chaired by Murty Yalla and Qiang Zhang (cosponsored with NERC)

For General Meeting 2021, PSDPC had initial plans for 8 panel sessions that will eventually result in ten 2h sessions, as detailed below.

The following 4h panel sessions are proposed by PSDP TFs and WGs and will be split in two 2h subsessions each according to the new virtual conference format:

- Sensing, Modeling and Control in Electric Power Systems with High Penetration of Inverter-Based Resources proposed by Modeling and Simulation of Large PS with High Penetration of Inverter Based Generation TF
- Water Power Generation, proposed by Adjustable Speed Pumped Storage Modeling TF

Also, the following 2h panel sessions are also planned for the 2021 GM using the remaining three 4h time slots available to PSDPC:

- Revisiting Stability Definitions and Classification, proposed by TF on Stability Definitions
- Synchronized waveform measurements: technology, requirements and applications proposed by Power Systems Dynamics Measurements WG
- Pushing the Frontier of Real-time Synchrophasor Applications and Their Practical Challenges, proposed by Power Systems Dynamics Measurements WG
- Modeling and Control Challenges of Weak Low-inertia Power Systems, proposed by Power System Dynamic Modeling WG
- Defining and Quantifying Resilience, proposed by Methods for Analysis and Quantification of PS Resilience TF
- Integrating Relay Models with RMS Dynamic Simulation, proposed by Integrating Relay Models with RMS Dynamic Simulations TF

Finally, PSDPC is cosponsoring with NERC one more panel session

1.3. Tutorials and webinars

The PSDPC has in recent years sponsored several successful tutorials. No tutorials were sponsored by the PSDPC during the 2020 GM but a webinar is planned for early 2021 by the Stability Definitions TF as well as the following half-day tutorial for GM 2021:

- Dynamic Modeling of Advance– Pumped-Storage Hydropower for Power System Planning Studies, proposed by Ed Muljadi

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

The benefits offered by the PSDP Committee 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). It is noted that some of the most downloaded reports from the Resource Center are PSDPC Technical report such as
 - PES_TR 66 on Microgrid Stability Definitions, Analysis, and Modeling
- 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, always related to power system dynamic performance.

3. Benefits to Volunteer Participants from the Committee Work:

The benefits to the PSDP Committee 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:
 - encouraging members to participate in different committee activities;
 - promoting and organizing panel sessions of interest to PSDPC members;
 - 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
 - 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 PSDP distinguished committee members were recognized in 2020 for their outstanding achievements:

PES and External Awards:

- Mike Gibbard of the University of Adelaide was awarded the 2020 IEEE PES Prabha S. Kundur Power System Dynamics and Control Award.
- Ken Martin was awarded the 2020 IEEE PES Charles Concordia Power System Engineering Award.
- Pete Sauer received the PES Lifetime Achievement Award
- Marija Ilić received the PES Outstanding Power Engineering Educator Award
- Claudio A. Canizares (Chair), Jim Reilly (Co-Chair), and Rodrigo Palma Behnke (Secretary) received the PES Working Group Recognition Award and Outstanding Technical Report Award for PES-TR66, Microgrid Stability Definitions, Analysis and Modeling

PSDPC Awards:

- The 2020 Prize Paper Award was presented to “Semi-Implicit Formulation of Differential-Algebraic Equations for Transient Stability Analysis” by Federico Milano, published in IEEE Trans. on Power Systems, Vol. 31, No. 6, Nov. 2016.
- PSDP Distinguished Service Award went to Glauco Taranto for his distinguished service and leadership in the IEEE Power Systems Dynamic Performance Committee

- PSDP Outstanding Technical Report Award and the 2020 IEEE PES Working Group Award to PES-TR66, “Microgrid Stability Definitions, Analysis and Modeling”, Chair: Claudio Canizares, Co-Chair: Jim Reilly, Secretary: Rodrigo Palma Behnke.
- Recognition Awards were presented to:
 - Kyle Thomas for his outstanding work and leadership as Chair of the Working Group on Power System Dynamic Measurements
 - Claudia A. Rahmann for her excellent work as PSDP Committee’s Technical Committee Program Chair

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, load modeling, and application of phasor measurement units in monitoring and control of system dynamic performance. In 2020, the Joint IEEE/TF/ CIGRE WG C4/C2.58 on Evaluation of Voltage Stability Assessment Methodologies in Transmission Systems started its activities via on-line teleconferences.

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. PSRCC members participate in a new PSDPC TF.

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 and other forms of renewable energy sources
- 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.



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In particular PSDPC has proposed for early 2021 the Trending Tech Topic: Active Distribution Networks, Interconnected Microgrids, and Energy Hubs

7. Problems and Concerns:

None to report.

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 8 Panel Sessions planned by the committee for the 2021 GM plus wone in collaboration with NERC, as previously mentioned.

8. Global Involvement:

The PSDPC is one of the most diverse Technical Committees in the PES. Below are estimated numbers of members from Regions 8, 9 and 10 (Africa, Europe, Middle East, Latin America, Asia and Pacific).

Total Number of committee members	Officers from regions 8,9 and 10	Subcommittee officers from regions 8, 9 and 10	Subcommittee members from regions 8,9, and 10
141 (52 or 38% from R8-10)	2 out of 4 officers (50%)	2 out of 4 officers (50%)	32 – 34%

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

Date: January 27, 2021