Special Compendium on All Power Electronics Grids

Deadline for Manuscript Submissions: 31 July 2022
Scheduled Publication Time: December 2022

Power electronics offer improved efficiency, controllability, and potentially enhanced grid resiliency. With the increasing penetration of inverter-based resources utilizing renewable, energy storage, and clean energy, the scenario of a high-penetration or even 100% power electronics-based power grid, a.k.a. All Power Electronics Grid (APEG), may become realistic for utility-scale power systems. One major challenge is the secure and stable operation without synchronous generators, which may require a different thinking of grid planning, analysis, and control methodologies from conventional practices. For example, system control architecture may likely become decentralized, the way operating such a grid to ensure system adequacy and security could be different when there is no longer an inherent physics between power balance and system frequency, new types of system instability can emerge such that new stability analysis and new stabilization approaches are required. Subsequently, new operational, management, and requirements for grid-forming and grid-following inverter controls need to be defined to be economically and efficiently robust and secure for normal conditions, and resilient for critical fault scenarios and extreme natural events. As a result, these motivate dynamic modeling and simulation, stability analysis and impending instability detection, advanced inverter controls, and converter designs for grid-forming or supporting functionalities.

Papers that demonstrate new topologies, modeling, analysis, and control approaches to address the issues and challenges of the APEG system are encouraged. Topics of interest include, but are not limited to:

Grid Architecture and Converter Topology
- System architecture and design methodology for enhanced grid controllability and resiliency
- Novel power converter topologies for grid applications
- New power electronics-based grid infrastructure and fault protection devices/schemes
- Testing and validation methods and standards

Modeling, Analysis and Simulation
- Transient modeling, including white-box, gray-box, and black-box approaches
- Impedance-based modeling and small-signal or large-signal stability analysis, subsynchronous and/or harmonic oscillations
- Open-source tools or co-simulations of relatively large-scale power electronics grid systems

Operation and Control
- Grid-forming control, grid-following control, and adaptive operation modes
- Linear and nonlinear control design for grid stabilization
- Decentralized/distributed control and optimization
- Cybersecurity for power electronics

We will be accepting both letter articles and full journal articles. A letter submission is still expected to include a literature review to establish its relationship to prior work, and present sufficient results to prove the validity and viability of proposed concept, but these parts must be written concisely to focus on the new idea and specific contribution. Works dealing with subjects that cannot be presented in this format because of the need for extensive literature review, lengthy analysis and derivation, and/or extensive experimental verification and validation shall be submitted as regular papers to the Transactions.

All manuscripts must be submitted through Manuscript Central at [https://mc.manuscriptcentral.com/oj-pel](https://mc.manuscriptcentral.com/oj-pel). Submissions must be clearly marked “Special Compendium on All Power Electronics Grids” on the cover page. When uploading your paper, please select the corresponding manuscript type for the special compendium. Please refer to [https://www.ieee-pels.org/](https://www.ieee-pels.org/) for general information about submitting through Manuscript Central.

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<tr>
<th>Guest Editors</th>
<th>Guest Associate Editors</th>
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| Yaosuo Xue  
Oak Ridge Natl. Lab., USA | Xiongfei Wang, Aalborg Univ., Denmark  
Kai Sun, Tsinghua Univ., China  
Yongheng Yang, Zhejiang Univ., China  
Ke Ma, Shanghai Jiao Tong Univ., China  
Adel Nasiri, Univ. of South Carolina, USA  
Cheng Wang, Nanjing Univ. of Sci. & Tech., China  
Dong Dong, Virginia Tech, USA  
Gab-Su Seo, Natl. Renewable Energy Lab., USA  
Jose Luis Dominguez-Garcia, Catalan Inst. for Energy Research, Spain  
Roberto Rosso, ENERCON GmbH, Germany  
Fred Wang, Univ. of Tennessee-Knoxville, USA  
Vito Monopoli, Tech. Univ. Bari, Italy | 31 Jul: Submission Deadline  
31 Aug: Decision  
(Accept/Reject) Notification  
10 Sept: Accept with Mandatory Revision Deadline  
30 Sept: Reject and Resubmit Deadline  
01 Nov: Early access in IEEE Xplore  
01 Dec: All articles appear in OJ-PEL |