

IEEE Journal of Emerging and Selected Topics in Power Electronics

Special Issue on Smart Solid State Transformers for AC/DC Hybrid Power Grids

Scheduled Publication Time: April 2021

Solid state transformers (SST) features a series of functional advantages, such as voltage level conversion, electrical isolation, power regulation and control, multiple AC and DC ports, power quality control and communications with other intelligent devices. In recent years, smart SST, also called as Smart Transformer (ST), has been developed based on the integration with advanced information technology. Smart SST has good application prospects in AC/DC hybrid distribution networks and microgrids for renewable energy integration, electric vehicle charging stations, data centers, rail and other fields.

Smart Transformer can provide reactive power support in MV (1~100kV) ac grids, improve grid power quality, damp resonances, and stabilize the electric grid, caused by high penetration of renewables. On the other hand, due to the capability of power flow control, the Smart Transformer can achieve soft load reduction, relieve voltage limits violation, and avoid overload of grid assets. The aforementioned capabilities allow the Smart Transformer to not only operate the hybrid grid in a radial configuration, but also in a meshed configuration. Consequently, the grid performances and resilience of the electric grid can be further improved. On the other hand, Smart Transformer can control the downstream grids as a controllable PQ node, avoiding extreme decentralization of the electric grid with high penetration of distributed generators and increasing the controllability of modern networks.

Thus, Smart Transformer can significantly improve the performance, efficiency and reliability of the system, and provide a variety of auxiliary functions. There are thus increasing research efforts made on their topology, modeling, control, design, simulation, manufacturing, communication, and artificial intelligence applications. This special issue focuses on the fundamental technical issues of smart solid state transformers and the advanced functions to intelligently operate the AC/DC hybrid power grids. Prospective authors are invited to submit original contributions, or survey papers, for review and publication in this special issue. Topics of interest include, but are not limited to:

- Novel topologies of solid state transformers featuring high efficiency and wide voltage gain range
- Modeling and simulation of solid state transformers with enhanced accuracy and reduced calculation
- Advanced control of solid state transformers in terms of converter level and system level
- New automatic design methodology of solid state transformers
- Design optimization of high frequency transformers and other passive components
- New communication techniques and cyber-security of smart solid state transformer
- Artificial intelligence techniques for smart solid state transformers
- Resilience and performances improvement in Smart solid-state transformer-fed hybrid and meshed AC/DC grids.

All manuscripts must be submitted through Manuscript Central at <http://mc.manuscriptcentral.com/jestpe-ieee>. Submissions must be clearly marked "Special Issue on Smart Solid State Transformers for AC/DC Hybrid Power Grids" on the cover page. When uploading your paper, please select your manuscript type as "Special Issue." Refer to <https://www.ieee-pels.org> for general information about electronic submission through Manuscript Central. Manuscripts submitted for the special issue will be reviewed separately and will be handled by the guest editorial board noted below.

Deadline for Submission of Manuscripts: Oct. 1st, 2020

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Proposed Timelines:

April 15th, 2020 – Official releasing of Call for Papers
October 1st, 2020 – Manuscripts Submission Deadline
December 1st, 2020 – Final Acceptance Notification
February 1st, 2021 – Manuscripts Forwarded to IEEE for Publication
April 1st, 2021 – Special Issue Appears in IEEE JESTPE