

IEEE Journal of Emerging and Selected Topics in Power Electronics
Special Issue on Modelling and Analysis of Interaction between Grids and Grid Connected Power Electronics Converters in Distribution Networks

Scheduled Publication Time: April 2021

Distribution networks have been integrated with different types of linear and nonlinear loads, which generate reactive power as well as network disturbances, in particular waveform distortion in a broad range of frequencies. High penetration of power electronics converters has the potential to degrade the power quality of grids introducing strong resonances in grids, waveform distortion (e.g. harmonics), transients or flicker, which pose severe risks to the distribution networks and equipment connected to them. Especially waveform distortion above and below 2 kHz, as well as fast transients, can cause failures in grid communication, degradation of equipment such as distribution transformers, losses of energy and affect system protection. This further faces the community with challenges in the measurement of voltage and current as well as in maintaining the requirements of the electricity codes and contractual obligations between network operators and users. These issues are, e.g.:

- generation of higher frequency distortion (switching frequency emission) and fast transients
- creation of new or shift existing resonant frequencies in grids, affecting communication signals
- strong interactions between grid and different types of power electronics converters, reducing harmonic instability, reliability and power quality of the grids

The automobile industry is going through an incredible transformation from internal combustion engines (ICEs) to all-electric vehicles (EVs). Some European countries have decided to ban all petrol-powered cars in the next 25-40 years.

Grid impedance and its variation have a significant impact on grid-connected power converter behaviour, interaction, stability and harmonic emission and immunity. Thus, grid impedance modelling and estimation is required for existing and future analysis of distribution networks with a high number of grid-connected inverters. Distribution networks, which consists of many feeders with varying population densities including the possible influence of specific weather patterns, soil characteristics and geographic location, need holistic modelling approaches to understand the impact of deploying new power system technologies. New analysis techniques based on artificial intelligence or clustering algorithms can be utilised for application with distribution feeders to find natural groupings based on various characteristics.

Prospective authors are invited to submit original contributions, survey papers, or tutorials, for review for publication in this Special Issue. Topics of interest include, but are not limited to:

- Modelling and control of parallel power converters
- Stability analysis and interactions between power converters
- Impacts of grounding on power converter interaction
- Grid distortion and disturbance impacts on power converters
- Assessment of frequency-dependent impedance on stability
- Immunity issues of large scale grid-connected converters
- IEEE and IEC standards and recommended practices
- Needs for revision of IEEE and IEC standards, e.g. regarding emission and immunity limits
- Quality aspects of industrial, commercial and residential grids

All manuscripts must be submitted through Manuscript Central at <http://mc.manuscriptcentral.com/jestpe-ieee>. Submissions must be clearly marked “Special Issue on Modelling and Analysis of Interaction between Grids and Grid Connected Power Electronics Converters in Distribution Networks” on the cover page. When uploading your paper, please select your manuscript type “Special Issue.” Refer to <http://www.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 Manuscript: Oct 30, 2020

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Proposed Timeline

- May 1, 2020 – Call for Papers to IEEE JESTPE Editorial Office
- Oct 30, 2020 – Manuscripts Submission Deadline
- Jan 30, 2021 – Final Acceptance Notification
- March 30, 2021 – Manuscripts Forwarded to IEEE for Publication
- April 30, 2021 – Special Issue Appears in IEEE JESTPE