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Special Session 09

Grid-Forming Technologies for Stability and Resilience of Converter-Dominated Power Systems

Introduction and Topics

The ongoing transition toward power-electronics-dominated power systems introduces significant challenges for maintaining system stability, reliability, and operational flexibility. Grid-forming (GFM) technologies have emerged as promising solutions to provide voltage and frequency support in converter-dominated grids with high shares of inverter-based resources. However, their practical deployment across transmission systems and active distribution networks remains limited. Existing research has largely focused on converter-level control design under specific operating conditions, while broader system-level challenges such as large-disturbance performance, resilience enhancement, and interactions among multiple converters remain insufficiently explored. Meanwhile, the rapid growth of renewable energy and emerging multi-energy systems further increases operational complexity. These developments highlight the need for integrated approaches that consider stability support from GFM resources together with system planning, coordination, and resilient operation in future low-inertia power systems.

This Special Issue aims to advance the understanding and application of grid-forming technologies beyond conventional control design toward system-level integration and optimization. In particular, it seeks contributions that investigate how GFM resources can enhance stability and resilience in converter-dominated grids while supporting large-scale renewable integration. The Special Issue also encourages studies that link GFM deployment with planning and allocation strategies, optimization-based operational frameworks, and coordinated energy management across transmission systems, active distribution networks, and emerging multi-energy infrastructures. In addition, perspectives from cyber-physical energy systems are welcomed to better understand the interactions between power electronics control, communication networks, and system operation.

Topics including but not limited to:

- Advanced grid-forming technologies for inverter-based resources
- Stability analysis and control of converter-dominated power systems
- Resilience enhancement using grid-forming converters
- Renewable integration supported by grid-forming capabilities
- Modeling and analysis of cyber-physical energy systems involving grid-forming resources
- Coordination of distributed energy resources in active distribution networks
- Planning, allocation, and optimization of grid-forming resources
- Grid-forming technologies in multi-energy systems and integrated energy infrastructures

Special Session Chairs

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Paper Submission

Submission Method

* View paper submission instruction on website
https://www.ieee-icps.com/sub.html

* Submit your paper through the website or QR code
https://easychair.org/conferences/?conf=ieeeicpsasia2026

Important Dates

Submission Deadline	April 30, 2026
Notification Deadline	May 31, 2026
Early-bird Registration Deadline	June 15, 2026
Author Registration Due	June 15, 2026

Publication

Submissions to IEEE I&CPS 2026 will be peer reviewed on the basis of technical quality, relevance to conference topics, originality, significance, clarity, etc. Accepted papers will be submitted for inclusion into IEEE Xplore subject to meeting IEEE Xplore's scope and quality requirements.

Excellent papers will be recommended for review by **IEEE Trans on Industry Applications** (proportion can reach up to 50%), **Global Energy Interconnection** and **DeCarbon**.

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