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Special Session on

"Advanced Power Electronics and Control Strategies for Energy Conversion and Storage Systems in Future Power System"

Organized by

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Call for Papers

The next generation of energy systems is defined by the high penetration of renewable energy sources such as wind farms and solar. Managing the variability and intermittency of these resources requires advanced energy storage systems—including power-to-X technologies, battery energy storage systems, and compressed air reservoirs—which are crucial for balancing supply and demand, improving grid stability, and enabling a sustainable and reliable energy future. The integration of these storage systems necessitates cutting-edge power electronic technologies and innovative control strategies to ensure efficient energy conversion, seamless operation, and reliable interaction with renewable energy sources. This Special Session aims to provide a platform for researchers, engineers, and industry professionals to present the latest advancements, address challenges, and explore emerging trends in power electronics and control for energy conversion and storage systems.

Topics of interest include, but are not limited to:

- Novel power electronic topologies for energy storage and conversion systems, including power-to-X systems, fuel cells, battery energy storage systems, and compressed air reservoirs.
- Advanced control strategies for grid-connected AC/DC, DC/AC, and DC/DC power converters in energy conversion and storage systems
- Power-to-X technologies and applications in grid decarbonization

- AI and machine learning innovations for energy conversion and storage system control and optimization
- Decentralized and autonomous control frameworks for hybrid energy systems with advanced storage technologies
- Enhancing grid stability and reliability under high renewable energy integration with storage technologies
- Advanced fault detection, diagnostics, and mitigation techniques for energy conversion and storage systems
- Cybersecurity and resilience in intelligent power electronics and storage integration
- Industrial applications of energy storage and conversion systems in renewable energy systems

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Additional information to be provided by promoters of the Special Session:

- **Brief CV of SS Organizers (photo, name, email, and short CV** (similar to Transactions paper CV)

Arman Fathollahi received his Ph.D. in Power Electrical Engineering from the Department of Electrical Engineering at Shahrekord University, Iran, in collaboration with Utah Valley University, USA, and Aarhus University, Denmark, in 2022. From November 2016 to 2018, he was a Research Assistant at the Smart Microgrid Research Center in Isfahan, Iran. From August 2021 to 2022, he served as a Research Assistant in the Department of Electrical and Computer Engineering at Aarhus University, Denmark, where he is currently a Postdoctoral Associate. His research interests include power system stability, power-to-X systems, power electronic control, power system analysis, renewable and sustainable energy, and electric vehicles.

Björn Andresen is currently the section Head of the Electrical Energy Technology Area, Aarhus University, Arhus, Denmark. He is furthermore internationally active in the standardization of Systems aspects for electrical energy supply, dealing with standards and the grid connection rules of generation and consumer systems to the grid. Furthermore, he has more than 20 years working expertise in relation to power converter design and operation and participated in several national and international research projects. His research interests include electrical energy transition, renewable power generation, grid integration, power systems, and power quality. He was the recipient of the International IEC 1906 Award for his expert role in relation to power quality.

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