Special Issue

Advancements in Low-Voltage Networks and Microgrids: Technologies, Challenges, and Future Directions

Message from the Guest Editors

Low-voltage networks, typically at the distribution level, are characterized by short feeders, predominantly resistive line impedances, and a high density of loads. These networks are undergoing a paradigm shift due to increasing DER penetration and microgrid deployment, introducing bidirectional power flows, rapid voltage and frequency variations, and complex interactions among parallel generators. Key operational challenges include advanced control, precise power-sharing mechanisms, energy management under uncertain generation and demand, hosting capacity limitations, stability, power quality, and protection under dynamic topologies with fast transients and harmonic disturbances. Contributions addressing these aspects are essential to advance the design, operation, and resilience of low-voltage microgrids.

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