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# Improving Power Quality in Smart and Renewable-Integrated Power Systems Through FACTS-Based Control

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**Abstract:** *The growing complexity of ultramodern power systems, driven by adding demand, integration of renewable energy sources, and strict quality conditions, increases the need for advanced power quality improvement ways. Flexible AC Transmission Systems (Data) bias — including Static Synchronous Compensators (STATCOM), stationary Var Compensators (SVC), Thyristor Controlled Series Capacitors (TCSC), and Unified Power Flow regulators (UPFC) — help maintain voltage stability, reduce harmonics, alleviate flicker, and ameliorate reactive power compensation. This paper reviews the functional principles, groups, and operations of FACTS device in enhancing power quality. It also examines case studies and simulation results that show how FACTS technology addresses issues similar as voltage sags, swells, harmonious deformation, and unstable loads. Integrating FACTS device into ultramodern grids improves effectiveness, trustability, and compliance with transnational power quality norms.*

**Keywords**: Power Quality, Flexible AC Transmission Systems (Data), STATCOM, SVC, TCSC, UPFC, Voltage Stability, Harmonic Mitigation, Reactive Power Compensation


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