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**Abstract title:**

Next-Generation SiC/GaN Variable Speed Drive Systems — “How to Handle a Double-Edged Sword”

**Abstract:**

Variable speed drive (VSD) systems should feature high power density and low installation costs, offer wide input and/or output voltage/motor speed ranges, and ensure low EMI without requiring shielded motor cables. Accordingly, next-generation high-switching speed / high-switching-frequency SiC/GaN PWM inverters should integrate  $dv/dt$  or LC output filters to prevent conducted or radiated EMI, reflections on long motor cables, high-frequency motor losses, motor insulation stresses, and bearing currents. Moreover, buck-boost capability should preferably be implemented. The talk reviews state-of-the-art filter concepts and multi-level inverter topologies and describes new three-phase buck-boost PWM inverter systems and modulation/control concepts currently under research at the Power Electronic Systems Laboratory of ETH Zurich, which are partly based on novel monolithic four-quadrant GaN switches. Finally, voltage and current DC-link all-GaN AC/AC converter systems are comparatively evaluated, and advantageous application areas for both system types are identified.