Extended Voltage Swell Ride-Through Capability for PWM Voltage-Source Rectifiers

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Voltage swells are one of the most harmful voltage disturbances for static power converters. A supply voltage increase may severely damage or trip converters, causing production and revenue losses. In the case of the PWM voltage source rectifier, a swell causes saturation of its control system, followed by a transition to 6-pulse operation that leaves the dc-link bus uncontrolled.

**Work Frame**

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**The Proposed Solution**

- Exploits dc-link voltage capacity by allowing dynamic overmodulation through the disturbance
- Draws inductive current to maintain control over the dc-link bus in case the former action does not suffice
- Employs a nonlinear control strategy to linearize and decouple the converter $d$-$q$ axes dynamics, assuring a dynamic response totally independent from the operating point. A desirable feature for high-performance ac drives

**Experimental Results**

- 10% voltage swell compensated solely by Dynamic Overmodulation (Fig. a, b)
- 15% voltage swell compensated by Dynamic Overmodulation and by drawing inductive current ($i_q < 0$) (Fig. c, d)