DVR Control System for Voltage SagSwell Compensation for Sensitive Loads Protection

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Abstract

This paper introduces an enhanced control system to improve the transient response of the dynamic voltage restorer (DVR). The control strategy achieves superior response against voltage disturbance approximately within 400 Õs. The control system comprises three terms: closed-loop feedback control signal, upstream disturbance detection error, and voltage drop over DVR term. The actual load voltage is compared with its reference value and is adapted by a PI controller. The upstream disturbance detection significantly enhances the transient time of the control system performance and improves its steady-state operation. In addition, the voltage drop over the DVR term represents the voltage drop caused by the DVR circuit component. Incorporating these effects in the control loop, fast and accurate response of the system are achieved. An L filter is used instead of the LC filter to overcome the inherent LC filter damping delay and resonance problem mentioned in previous studies. The system is simulated using MATLAB/ Simulink. The simulation results show excellent response in transient and steady-state operation for various operating conditions.

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