Proposing an Efficient DC Voltage Conditioning Device for LVDC Systems

Voltage quality is an important issue for low voltage DC systems (LVDC) including sensitive loads. This paper proposes a multi-purpose DC Voltage Conditioning Device (DCVC) to compensate the voltage disturbances and fluctuations in a DC microgrid. This device is a series connected element that can control the DC voltage in a standard limit at the load point and presents a high quality power supply for sensitive loads in DC microgrid. DCVC acts as a voltage conditioner by injecting required positive/negative voltage into the distorted DC voltage. This is done by a controlling command to the switches and helps fast restoring of the DC voltage to its normal state. A simple LVDC microgrid is simulated using PSCAD/EMTDC and the effect of DCVC is studied under different voltage disturbances; i.e. voltage sag/swell and voltage disturbances resulting from pulsating loads. Results show that the proposed DCVC with an appropriate controller is able to improve the system voltage quality during various disturbances.

Keywords: Power quality; voltage sag/swell; Full-bridge converter

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