

## Comparative Analysis of Control Techniques Based Sliding Mode for Transient Stability Assessment for Synchronous Multicellular Converter

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**Abstract :** This paper features a comparative study performance of sliding mode controller (SMC) for closed-loop voltage control of direct current to direct current (DC-DC) three-cells buck converter connected in parallel, operating in continuous conduction mode (CCM), based on pulse-width modulation (PWM) with SMC based on hysteresis modulation (HM) where an adaptive feedforward technique is adopted. On one hand, for the PWM-based SM, the approach is to incorporate a fixed-frequency PWM scheme which is effectively a variant of SM control. On the other hand, for the HM-based SM, oncoming an adaptive feedforward control that makes the hysteresis band variable in the hysteresis modulator of the SM controller in the aim to restrict the switching frequency variation in the case of any change of the line input voltage or output load variation are introduced. The results obtained under load change, input change and reference change clearly demonstrates a similar dynamic response of both proposed techniques, their effectiveness is fast and smooth tracking of the desired output voltage. The PWM-based SM technique has greatly improved the dynamic behavior with a bit advantageous compared to the HM-based SM technique, as well as provide stability in any operating conditions. Simulation studies in MATLAB/Simulink environment have been performed to verify the concept.

**Keywords :** DC-DC converter, hysteresis modulation, parallel multi-cells converter, pulse-width modulation, robustness, sliding mode control

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