

## Continuous-Time Analysis And Performance Assessment For Digital Control Of High-Frequency Switching Synchronous Dc-Dc Converter

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**Abstract :** This paper features a performance analysis and robustness assessment of a digitally controlled DC-DC three-cell buck converter associated in parallel, operating in continuous conduction mode (CCM), facing feeding parameters variation and loads disturbance. The control strategy relies on the continuous-time with an averaged modeling technique for high-frequency switching converter. The methodology is to modulate the complete design procedure, in regard to the existence of an instantaneous current operating point for designing the digital closed-loop, to the same continuous-time domain. Moreover, the adopted approach is to include a digital voltage control (DVC) technique, taking an account for digital control delays and sampling effects, which aims at improving efficiency and dynamic response and preventing generally undesired phenomena. The results obtained under load change, input change, and reference change clearly demonstrates an excellent dynamic response of the proposed technique, also as provide stability in any operating conditions, the effectiveness is fast with a smooth tracking of the specified output voltage. Simulations studies in MATLAB/Simulink environment are performed to verify the concept.

**Keywords :** continuous conduction mode, digital control, parallel multi-cells converter, performance analysis, power electronics

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