CONSTANT ON/OFF-TIME DIGITAL PULSEWIDTH MODULATION CONTROL FOR SYNCHRONOUS BUCK CONVERTER

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ABSTRACT

This paper describes a constant on/off-time digital pulse width modulation for synchronous buck DC-DC converter to reduce the switching frequency and switching losses. Compared to constant frequency modulation, constant on-time modulation control or constant off-time modulation control can achieve fine time resolution with small circuits. However, the switching frequency increases dramatically for the constant on/off-time modulation method under heavy/light load conditions, respectively. By using this control technique, under light load condition, constant on-time modulation control is used while constant off-time modulation control is adapted under heavy load condition. It eliminates the need of high performance controller and switching frequency can be limited to a certain range. This control technique is verified through simulation and successfully implemented the control strategy in real-time by employing a dSPACE controller 1104.

KEYWORDS: DC/DC Converter, Digital Pulse Width Modulation (DPWM), Digital Signal Processing and Control Engineering (dSPACE)