

Design of a Voltage Controller for a DC-DC Buck Converter Using Fractional-Order Terminal Sliding Mode Control Strategy

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Abstract : This paper suggests a fractional-order terminal sliding mode control (FO-TSMC) method for the output voltage regulation of a DC-DC buck converter influenced by disturbances, such as the variations of load resistance and input voltage. A this kind of a new fractional-order (FO) dynamic sliding surface is designed to avoid the drawback on integer-order (IO) terminal sliding mode control (IO-TSMC) method and guarantee the converter reach steady-state quickly without chattering even if it undergoes arbitrary random disturbances. The proposed FO-TSMC controller's performance is compared against to both IO-TSMC and traditional SMC control approaches. Computer simulation results display that the novel FO-TSMC approach results in evenhanded output voltage regulation performance under widely input voltage variations and load changes.

Keywords : Sliding Mode Control (SMC), terminal sliding mode control (TSMC), fractional-order (FO), DC-DC buck converter