Refine Control Methodology and Implementation of Capacitor Voltage Control for Improved Switched Inductor Z-Source Inverter

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Abstract

Nowadays, Z-source inverter has received several attentions compared to the other power converters owing to its simplicity and reliability. In this paper, a refine control methodology of capacitor voltage control is presented based on third-order small signal analysis. The proposed control is applied to the improved switched inductor Z-Source inverter (ISL ZSI). Proportional, integral and derivative controller (PID) is adopted due to its capability to operate with large operation levels , reliable operation, and cheaper in implementation. In addition, the function of this control can be achieved even with incomplete system data or parameters variations. ISL-ZSI has been presented because of its advantages such as the high gain of DC voltage, low voltage stress for both the Z-network and the inverter bridge switches and ensure good soft starting. in addition, the inrush current has been removed based on its configuration. The proposed control is validated by both experimental and simulation results under input voltage change, load change, and steady state operations using DSP F28335 and MATLAB SIMULINK Real-Time Workspace (RTW).

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