Design and Analysis of Feedback Control for DC-DC Buck Converter

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The DC-DC buck converters have wide range of emerging applications such as in photovoltaic systems and linear drives which have the requirement of high efficiency and optimum transient response over dynamic changes in line voltage and load. The purpose of this manuscript is to make a DC-DC buck converter robust against the deviations in the input voltage, load current and to reduce the steady state error. In this paper averaging and linearization of buck converter has been done and then applying K-Factor method controller has been designed in such a way that stabilizes the output voltage of buck converter irrespective of the line voltage and load disturbances. Mathematical analysis and MATLAB simulation waveforms of proposed method validate that output voltage is maintained irrespective of the disturbance in line voltage and load variations while retaining acceptable phase margin.

Keywords: DC-DC buck converter, PWM converter, Compensator, Phase margin, Bode plot.