Optimizing the Efficiency and Performance of DC/DC Power Electronic Converters

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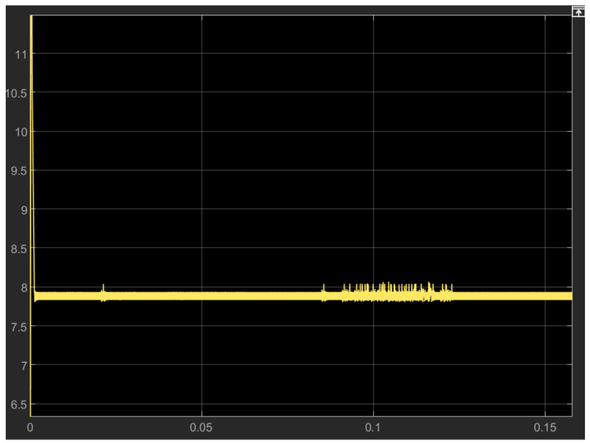
Abstract

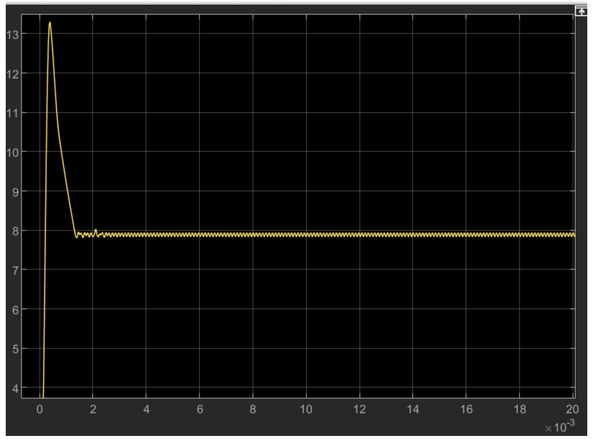
Investigating DC/DC power electronic converter control strategies is essential to solving problems related to inductance regulation in variable passive devices. Like how inductance management is complicated by parasitic effects in magnetic materials, DC/DC converters too have challenges with dynamic regulation. Using techniques for modulating inductance from earlier research, this study seeks to increase converter performance through sophisticated control strategies like digital control and PWM. The objective of this project is to develop real-time control mechanisms to improve the efficiency and stability of power electronic converters by expanding upon the knowledge of regulating parasitic effects.

Waveforms

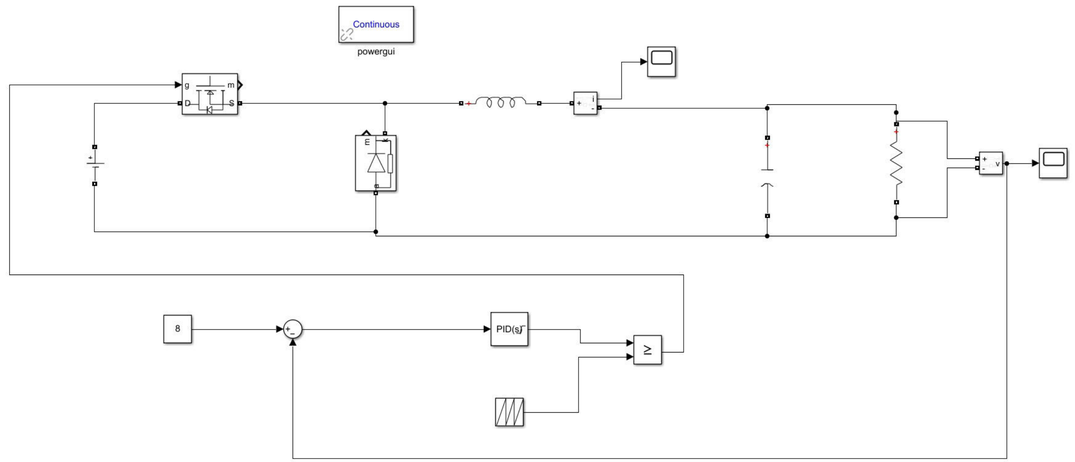
P = 5 | I = 0 | D = 0



P = 5 | I = 0.5 | D = 0



Buck Converter Control System



Future Steps

- Solve problems related to inductance regulation in variable passive devices
- Establish rapid and efficient control using components that are reasonably accessible.

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