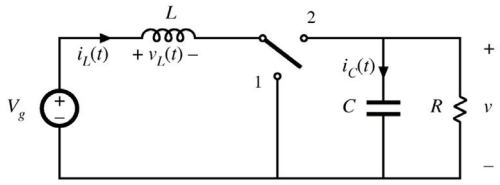
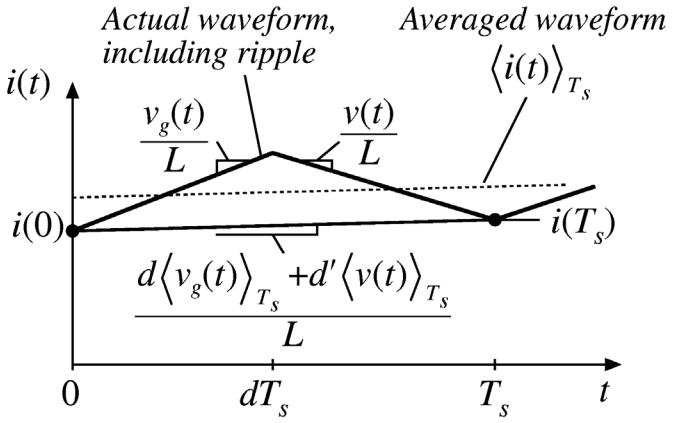
Averaging in Transient Operation



Averaging: Correct Prediction



The net change in inductor current over one switching period is exactly equal to the period T_s multiplied by the average slope $\langle v_L \rangle_{T_s} / L$.

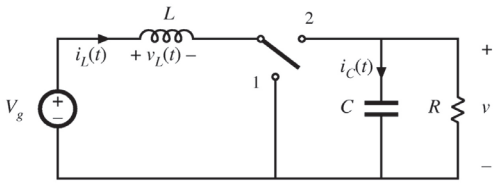
Averaging: Discussion

Small Signal Modeling: Linearization

(1) Perturb and Linearize

(2) 1st order Taylor Series Expansion

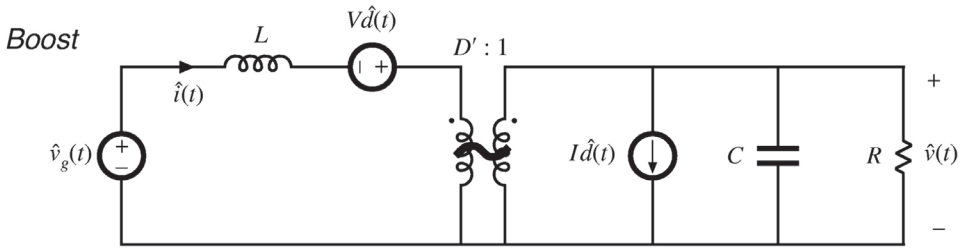
Equivalent Circuit Modeling: Boost Example



Linearization

Equivalent Circuit Model

Boost Converter Averaged, AC, Linear Circuit Model



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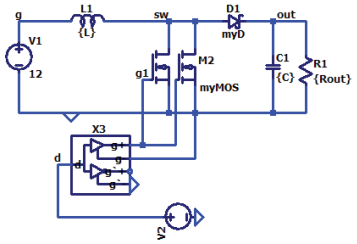
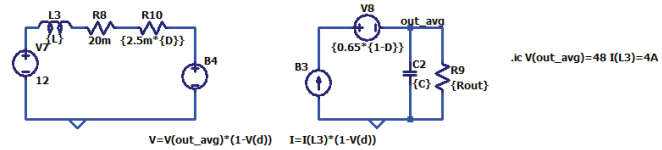
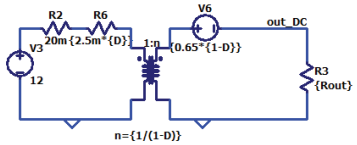
Model Simulation



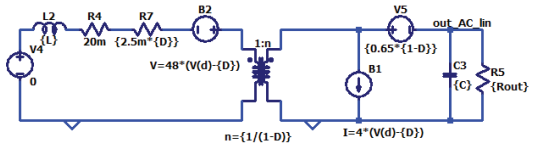
Full Switching Model



Averaged, Nonlinear

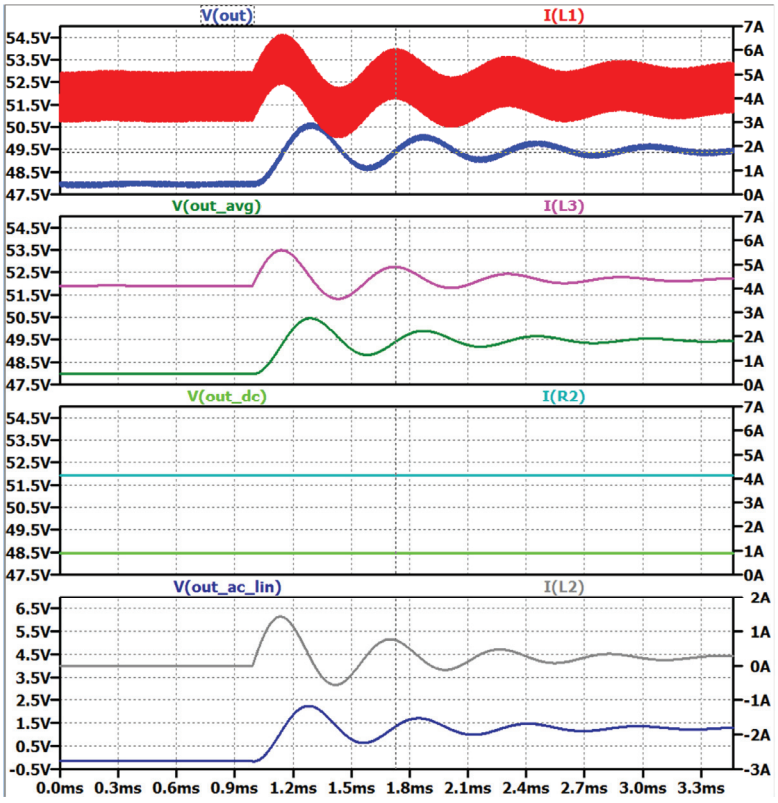


DC Averaged Model



AC Averaged,
Linearized Model

Model Comparison



Full Switching Model

Averaged, Nonlinear

DC Averaged Model

AC Averaged,
Linearized Model