Steady-State Equivalent Circuit Modeling

3.1. The dc transformer model

3.2. Inclusion of inductor copper loss

3.3. Construction of equivalent circuit model

3.4. How to obtain the input port of the model

3.5. Example: inclusion of semiconductor conduction losses in the boost converter model

3.6. Summary of key points

Ideal Transformer Model

Simplifying Circuits with Ideal XF

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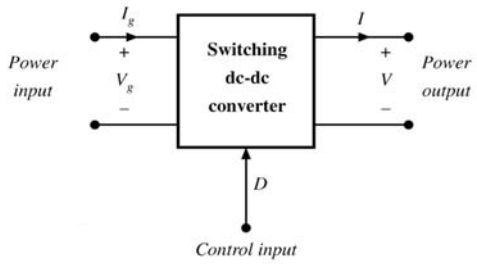
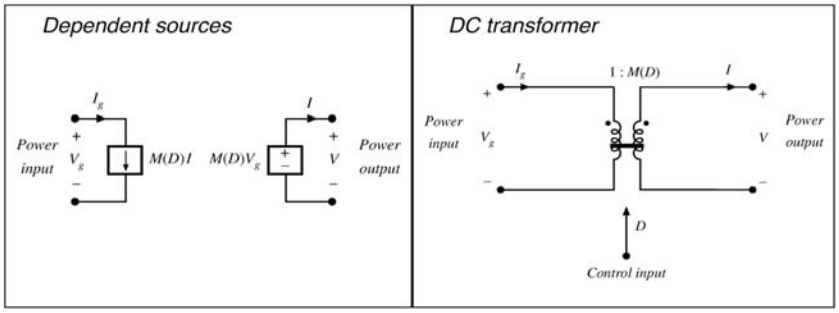
Simplifying Circuits with Ideal XF

The DC Transformer Model



DC-DC Converter Equivalent Circuit

$$P_{in} = P_{out} \qquad V_g I_g = V I \qquad V = M(D)\, V_g \qquad I_g = M(D)\, I$$

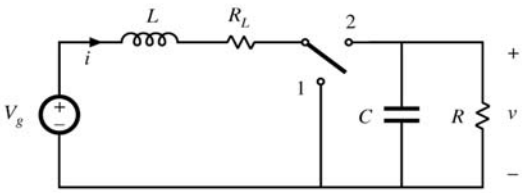


Inclusion of Copper Loss

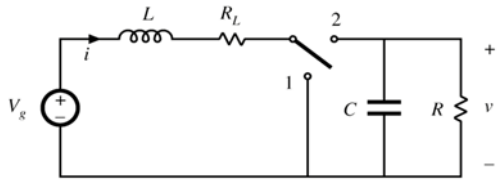
Dc transformer model can be extended, to include converter nonidealities.

Example: inductor copper loss (resistance of winding):

Insert this inductor model into boost converter circuit:



Nonideal Boost Converter



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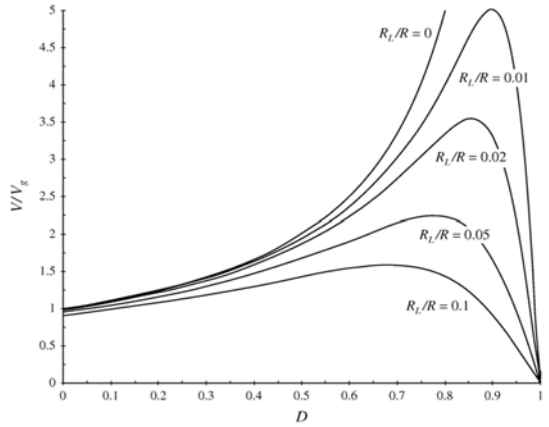
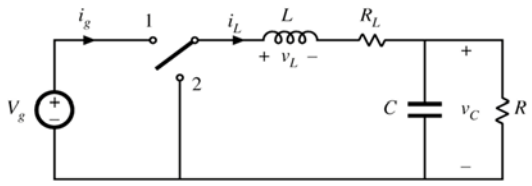
Nonideal Boost Output Voltage



Construction of Equivalent Circuit Model

Buck Converter: Input Port Model

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