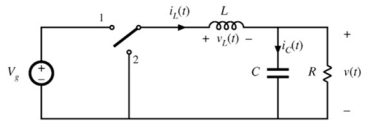
Application to Switching Systems



Steady-State Model

Discrete Time Model

D. J. Packard, "Discrete modeling and analysis of switching regulators," Ph.D. dissertation, California Institute of Technology, Nov. 1976.

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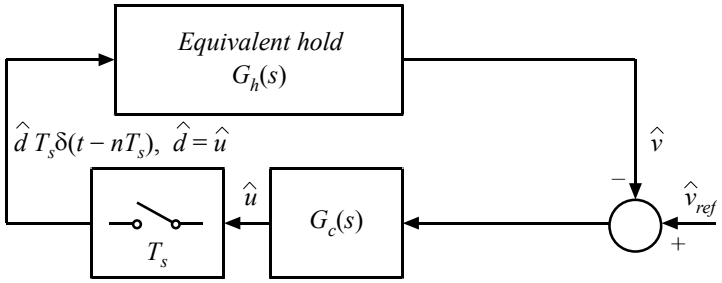
Sampled Data Model



- Sampled-data model valid at all frequencies
- *Equivalent hold* describes the converter small-signal response to the sampled duty-cycle perturbations [Billy Lau, PESC 1986]
- State-space averaging or averaged-switch models are low-frequency continuous-time approximations to this sampled-data model

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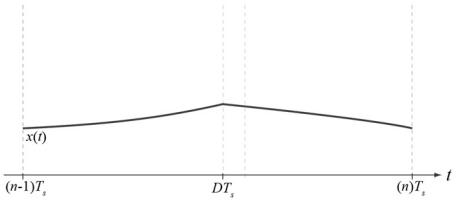
Small Signal: Natural Response



D. Maksimovic and R. Zane, "Small-signal discrete-time modeling of digitally controlled PWM converters," IEEE Trans. Power Electron., vol. 22, no. 6, pp. 2552 –2556, nov. 2007.

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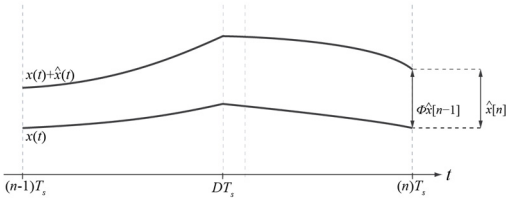
Small Signal: Natural Response



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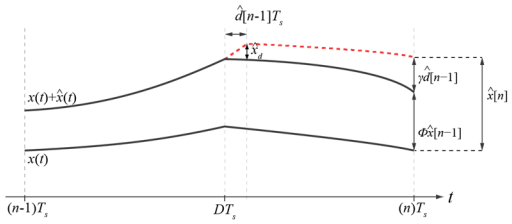
Small Signal: Natural Response



Complete Small-Signal Model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