

# Sliding Control Modes.

## *3. Examples and Exercises.*

*Basic converters in DC-DC and DC-AC operation modes.*

*Analysis and design*

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1. Example. A DC-DC buck converter will be analysed. We will focus on the transversality condition, the ideal sliding dynamics and the control gains design. Ideal sliding dynamics analysis allows recovering the electronic characteristics of the converter.
2. Exercise. Analyse the boost converter. Notice that the system is non-minimum phase when the voltage is taken as output. Choose a sliding surface depending only on the current presumed you know the load and the input voltage. Is this closed loop system robust?, if not make it robust modifying the sliding surface design by adding an integral term.
3. Example. Analysis of a DC-AC buck converter. Tracking and regulation problems.

Details can be found in

- H. Sira-Ramírez. *Sliding Motions in Bilinear Switched Networks*. IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS, VOL. CAS-34, No. 8, AUGUST 1987.
- D. Biel et al. *Application of Sliding-Mode Control to the Design of a Buck-Based Sinusoidal Generator*. IEEE TRANSACTIONS ON INDUSTRIAL ELECTRONICS, VOL. 48, NO. 3, JUNE 2001.

