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Continuing Education Course #072
Switchmode Boost Power Converter
Using Current-Mode Control

1. Reasons for using a Boost power converter include:
 - a. the output voltage is higher than the supply voltage,
 - b. high conversion efficiency is required,
 - c. a switch-mode solution is acceptable,
 - d. all of the above.
2. Average input and output currents to a Boost converter are nearly equal:
 - a. True,
 - b. False.
3. The inductor current in a Boost converter is:
 - a. constant,
 - b. rectangular waveshape,
 - c. DC plus a triangular waveshape,
 - d. DC plus a rectangular waveshape,
4. The inductor voltage in a Boost converter is:
 - a. constant,
 - b. rectangular waveshape,
 - c. DC plus a triangular waveshape,
 - d. DC plus a rectangular waveshape.
5. DC resistance of the inductor in a Boost converter contributes to power loss:
 - a. True,
 - b. False.
6. Output capacitor ripple voltage in a Boost converter depends on inductor current through the output switch:
 - a. True,
 - b. False.
7. Boost current-mode control signals can be obtained from an inserted sense resistor:
 - a. True,
 - b. False.
8. Current-mode control signals can be employed for current limit functions:
 - a. True,
 - b. False.
9. Boost converter current-mode control employs both current and voltage control loops:

- a. True,
- b. False.

10. The equivalent load resistor in a current-mode controlled Boost converter contributes a load-dependent right-half plane zero in the open-loop behavior:

- a. True,
- b. False.

11. The PZ compensator in a current-mode controlled Boost converter can be implemented with a transconductance and an impedance network:

- a. True,
- b. False.

12. The Pole-Zero (PZ) compensator for current-mode control uses an integrator pole for:

- a. high DC gain,
- b. cancellation of resonance induced phase,
- c. PZ compensator bandwidth limitation,
- d. none of the above.

13. The Pole-Zero (PZ) compensator for current-mode control uses two zeroes:

- a. True,
- b. False.

14. The transfer function from current-control comparator input to inductor current is:

- a. an incremental voltage gain,
- b. an incremental current gain,
- c. an incremental transconductance
- d. none of the above.

15. Switchmode sampling introduces a Zero-Order Hold delay in the feedback loop:

- a. True,
- b. False.

16. Switchmode sampling introduces a Nyquist “notch” in the feedback loop:

- a. True,
- b. False.

17. The Flip/Flop Pulse-Width Modulator (PWM) discussed can support:

- a. minimum pulse control,
- b. maximum control,
- c. current-mode pulse-by-pulse control,
- d. all of the above.

18. A soft-start reference ramp can be used to:

- a. limit starting current from the supply,
- b. avoid control saturation at startup,
- c. both of the above,
- d. none of the above.

19. A Boost converter with current-mode control cannot start with the load applied:

- a. True,
- b. False.

20. An otherwise stable Boost converter with current-mode control must momentarily encounter 100% duty cycle requirements when a transient load is applied suddenly:
- a. True,
 - b. False.
21. An otherwise stable Boost converter with current-mode control must momentarily encounter 0% duty cycle requirements when a transient load is removed suddenly:
- a. True,
 - b. False.
22. Required average inductor current changes in a current-mode controlled Boost converter are associated with non-zero feedback error voltages:
- a. True,
 - b. False.
23. Sampling a Boost converter with a longer period generally requires larger inductor and capacitor values:
- a. True,
 - b. False.
24. A peak-current-controlled Boost converter's system stability is compromised if the required duty cycle is $D > 0.5$ and no, or inadequate, slope compensation is present:
- a. True,
 - b. False.
25. Optimal Slope compensation occurs with a sawtooth that has a slope equivalent to:
- a. the rising rate of inductor current,
 - b. the falling rate of inductor current,,
 - c. none of the above.

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