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Continuing Education Course #067  
Switchmode Buck Power Converter  
Using Current-Mode Control

1. Reasons for using a Buck power converter include:
  - a. the output voltage is lower 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 Buck converter are nearly equal:
  - a. True,
  - b. False.
3. . The inductor current in a Buck 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 Buck 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 Buck converter contributes to power loss:
  - a. True,
  - b. False.
6. Output capacitor ripple voltage in a Buck converter depends on inductor ripple current:
  - a. True,
  - b. False.
7. Current-mode control signals can be obtained from the inductor parasitic ESR:
  - a. True,
  - b. False.
8. Current-mode control signals can be employed for current limit functions:
  - a. True,
  - b. False.
9. Buck 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 Buck converter contributes a load-dependent pole in the open-loop behavior:

- a. True,
- b. False.

11. The PZ compensator in a current-mode controlled Buck 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 Pole-Zero (PZ) compensator for voltage-mode control uses one pole for:

- a. higher DC gain,
- b. cancellation of resonance induced phase,
- c. PZ compensator bandwidth limitation,
- 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 Buck converter with current-mode control cannot start with the load applied:

- a. True,
- b. False.

20. An otherwise stable Buck 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 Buck 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 Buck converter are associated with non-zero feedback error voltages:

- a. True,
- b. False.

23. Sampling a Buck converter with a longer period generally requires larger inductor and capacitor values:

- a. True,
- b. False.

24. A peak-current-controlled Buck 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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