**Seminar4**

1. Take **buck** converter / **boost** converter as example:
   1. For given input/output voltage and circuit parameters, calculate the theoretical value of ***inductor current ripple, capacitor voltage ripple*** and do simulations to verify the calculation results
   2. For **buck converter**, adjust the duty cycle ***D*** from 0 to 0.8, describe the relationships between duty cycle ***D*** and ***inductor current ripple, capacitor voltage ripple, voltage gain (G=Vo/Vin)*** and verify your results through simulation.

For **boost converter**, adjust the duty cycle ***D*** from 0.3 to 0.8, describe the relationships between duty cycle ***D*** and ***inductor current ripple, capacitor voltage ripple, voltage gain (G=Vo/Vin)*** and verify your results through simulation.

**TAB I. Parameters for Question 1)**

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| **Group** | **Circuit** | **Parameters** |
| 1 | **Buck** converter | Vin=300V, Vo=250V, RL=50Ω, fs=50kHz, L=2mH, C=50uF |
| 2 | **Buck** converter | Vin=400V, Vo=300V, RL=20Ω, fs=100kHz, L=1mH, C=50uF, |
| 3 | **Buck** converter | Vin=200V, Vo=120V, RL=60Ω, fs=100kHz, L=4mH, C=50uF, |
| 4 | **Buck** converter | Vin=100V, Vo=80V, RL=20Ω, fs=100kHz, L=2mH, C=30uF, |
| 5 | **Buck** converter | Vin=540V, Vo=270V, RL=20Ω, fs=20kHz, L=2mH, C=80uF, |
| 6 | **Boost** converter | Vin=250V, Vo=300V, RL=50Ω, fs=50kHz, L=1mH, C=200uF |
| 7 | **Boost** converter | Vin=300V, Vo=400V, RL=100Ω, fs=100kHz, L=800uH, C=200uF, |
| 8 | **Boost** converter | Vin=120V, Vo=200V, RL=20Ω, fs=100kHz, L=300uH, C=100uF, |
| 9 | **Boost** converter | Vin=80V, Vo=100V, RL=20Ω, fs=100kHz, L=100uH, C=100uF, |
| 10 | **Boost** converter | Vin=270V, Vo=540V, RL=40Ω, fs=20kHz, L=1mH, C=100uF, |

1. Take ***full-bridge inverter*** + ***full-wave rectifier*** structure as example:
   1. For given input/output voltage and circuit parameters, do simulations to study the operating principle and analyze the operating sequence.
   2. Adjust the load resistor to realize ***continuous current mode*** (**CCM**) and ***discontinuous current mode*** (**DCM**) and verify through simulation.
   3. Adjust duty cycle ***D*** and analyze the relationships between ***D*** and ***voltage gain (G=Vo/Vin)***

**TAB II. Parameters for Question 2)**

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| **Group** | **Parameters** |
| 1 | Vin=300V, Vo=48V, T=5:1:1, RL=10Ω, fs=50kHz, L=500uH, C=50uF |
| 2 | Vin=500V, Vo=200V, T=2:1:1, RL=10Ω, fs=100kHz, L=1mH, C=100uF, |
| 3 | Vin=800V, Vo=50V, T=6:1:1, RL=20Ω, s=100kHz, L=600uH, C=200uF, |
| 4 | Vin=1000V, Vo=200V, T=4:1:1, RL=40Ω, fs=50kHz, L=800uH, C=200uF, |
| 5 | Vin=540V, Vo=24V, T=10:1:1, RL=5Ω, fs=20kHz, L=5mH, C=300uF, |
| 6 | Vin=250V, Vo=24V, T=6:1:1, RL=10Ω, fs=50kHz, L=2mH, C=200uF |
| 7 | Vin=600V, Vo=48V, T=4:1:1; RL=10Ω, fs=100kHz, L=300uH, C=200uF, |
| 8 | Vin=800V, Vo=120V, T=4:1:1, RL=20Ω, fs=100kHz, L=500uH, C=200uF |
| 9 | Vin=900V, Vo=60V, T=20:3:3, RL=10Ω, fs=100kHz, L=600uH, C=200uF, |
| 10 | Vin=700V, Vo=24V, T=10:1:1, RL=10Ω, fs=20kHz, L=500uH, C=300uF, |