INTRODUCTORY LTSPICE SIMULATIONS

ENERGY HARVESTING

EH-202420

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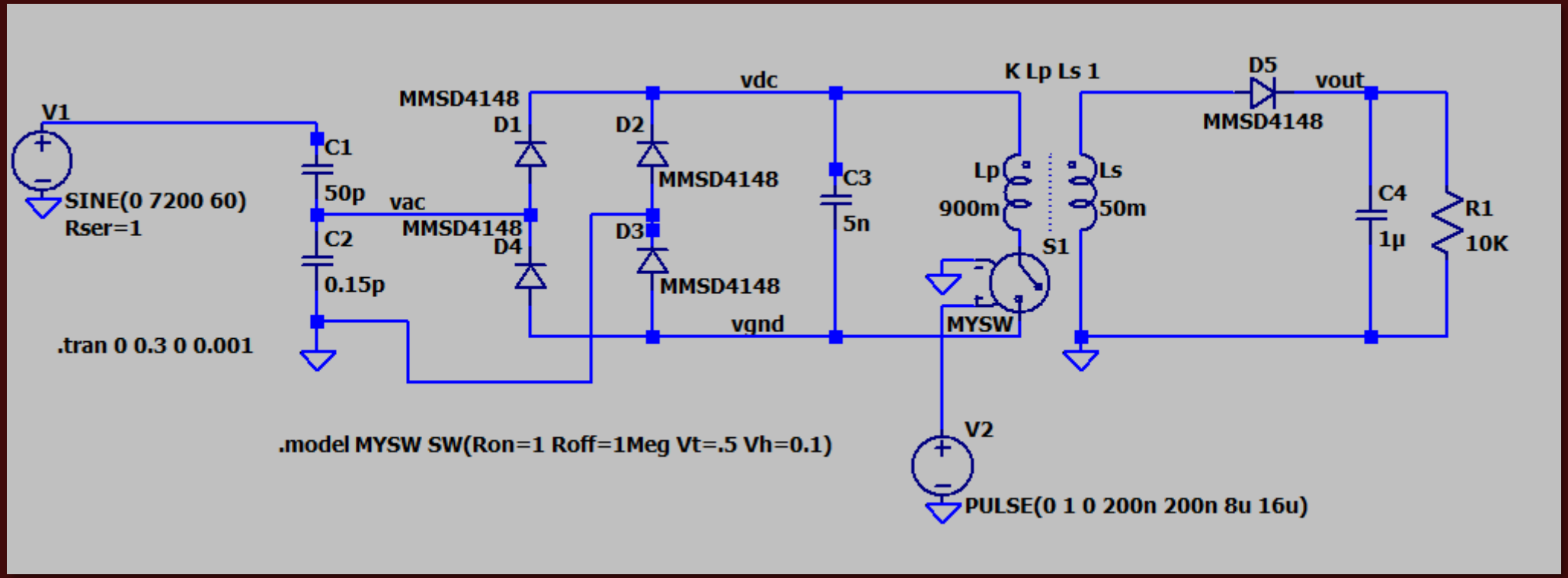
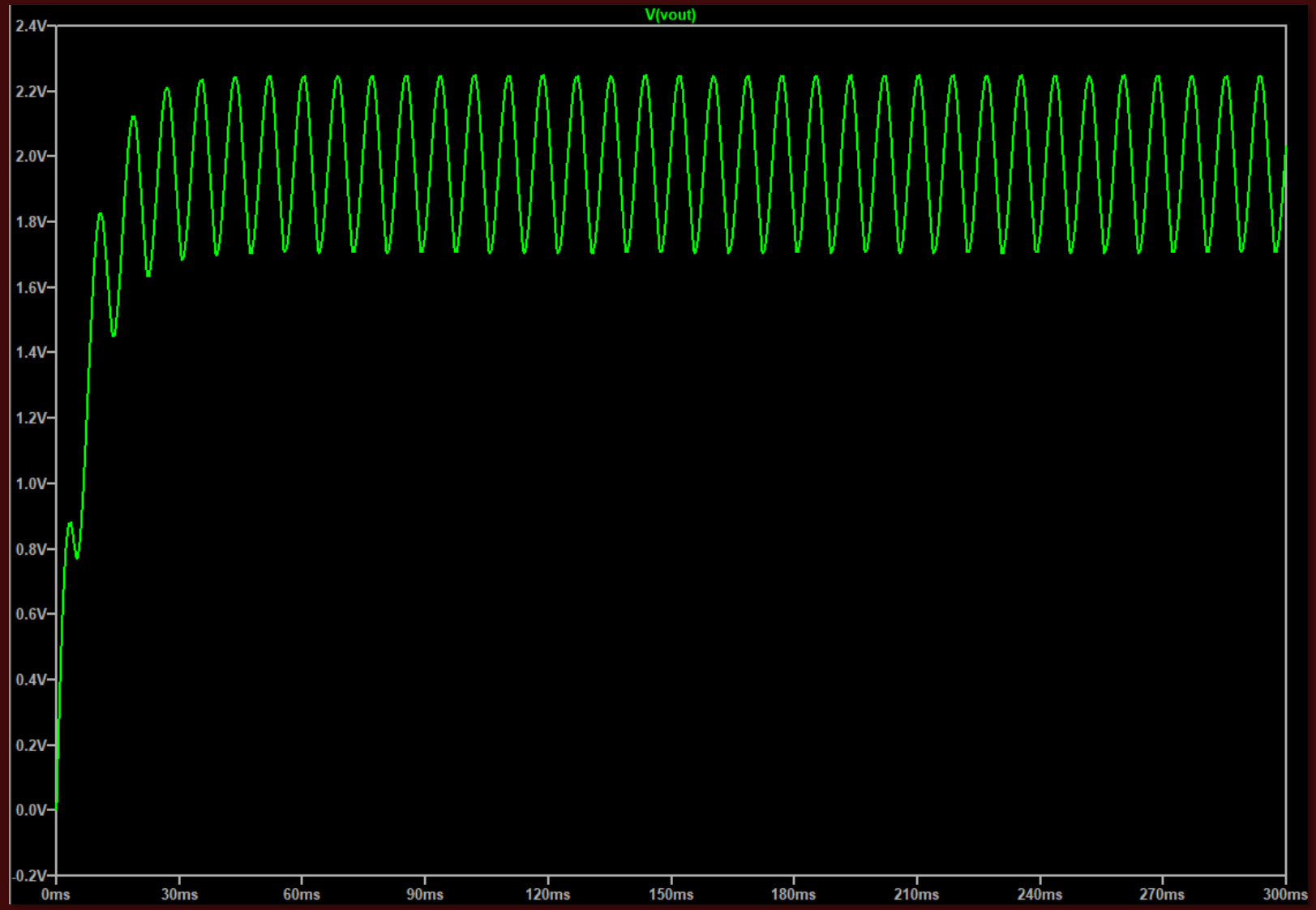
Circuit I - Schematic

- Switching element on bottom of primary coil, 50% duty cycle.
- After 100ms, V_L=46.65V, I_L=466.5µA → P_L=21.7mW (Spot on with 2nd paper.)

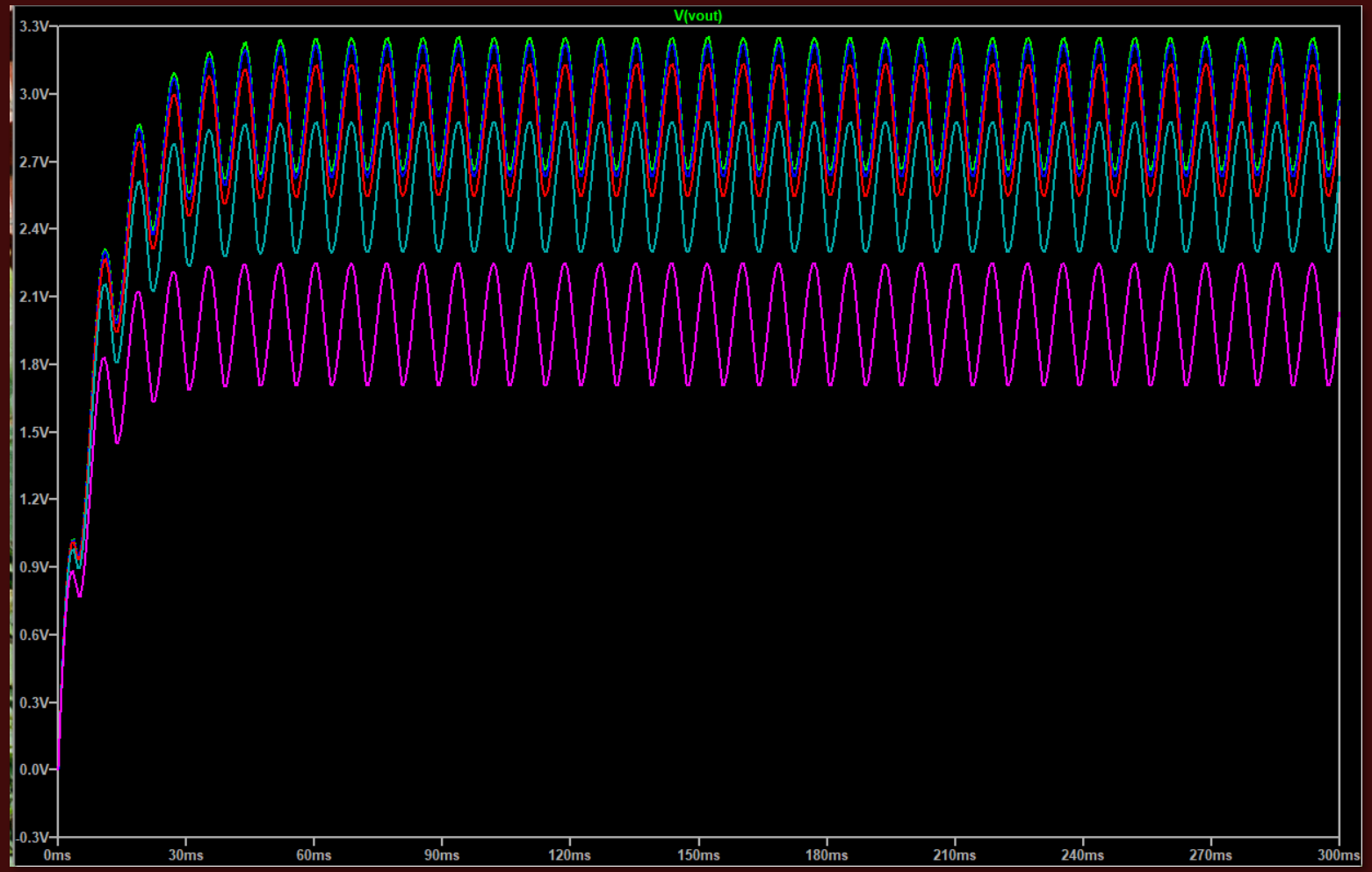


Circuit I - Waveforms



Circuit I – Waveforms (cont.)

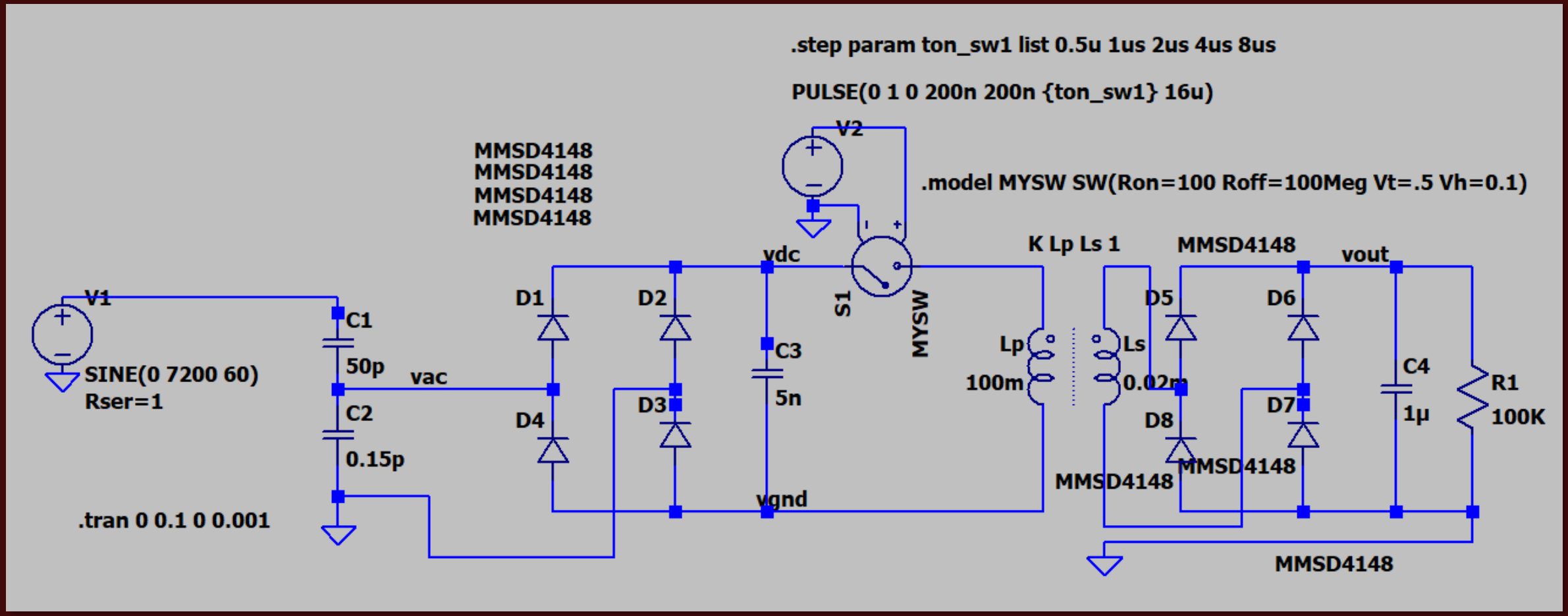
Doing a parametric sweep of the switching element’s on-time, i.e. a sweep of duty cycle.



Increasing Duty Cycle

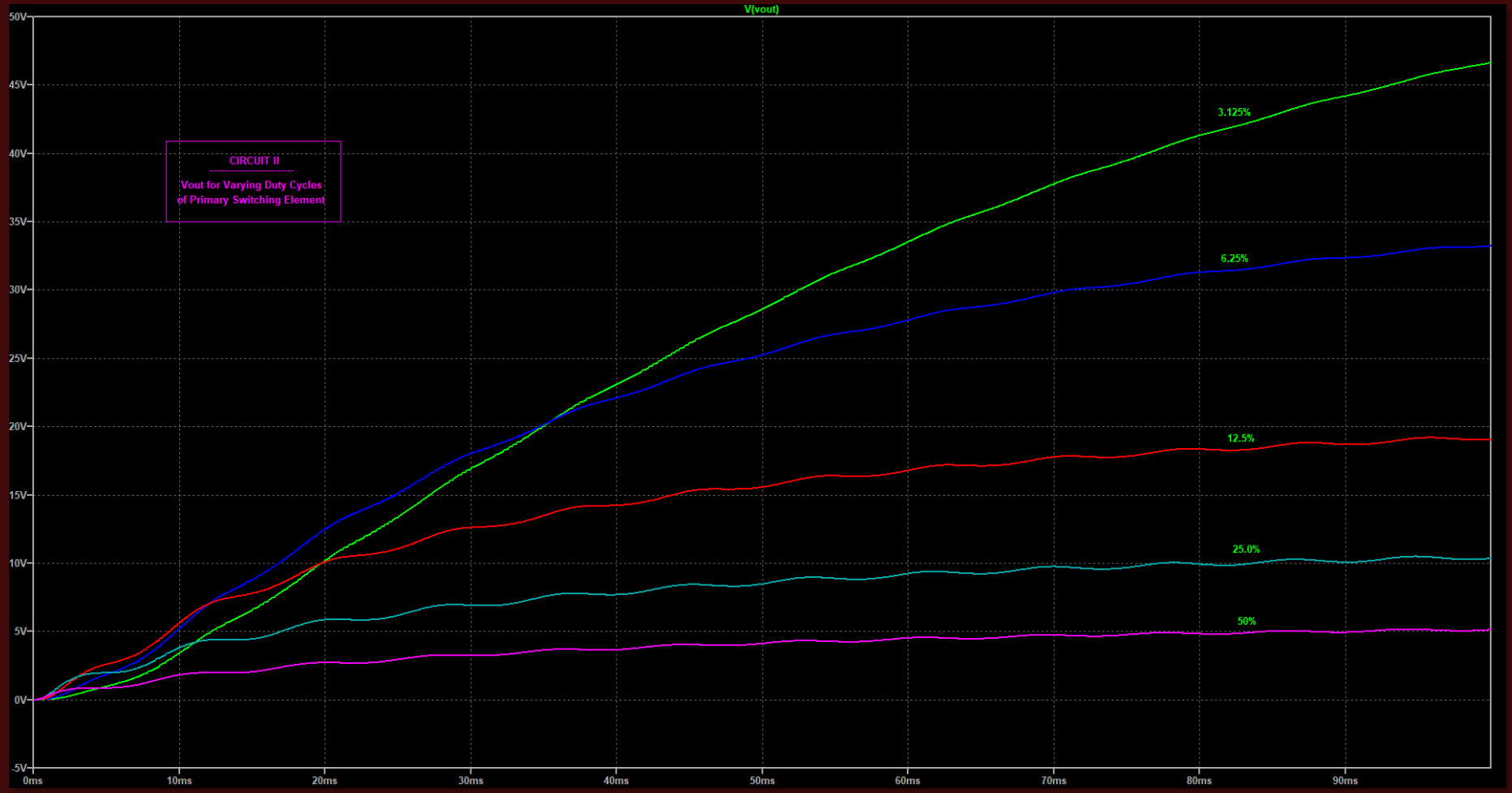
Circuit II - Schematic

- Switching element on top of primary coil, 3.125% duty cycle.
- Second rectifier on secondary side.
- After 100ms, V_L=46.65V, I_L=466.5µA → P_L=21.7mW (Spot on with 2nd paper.)



Circuit II - Waveforms

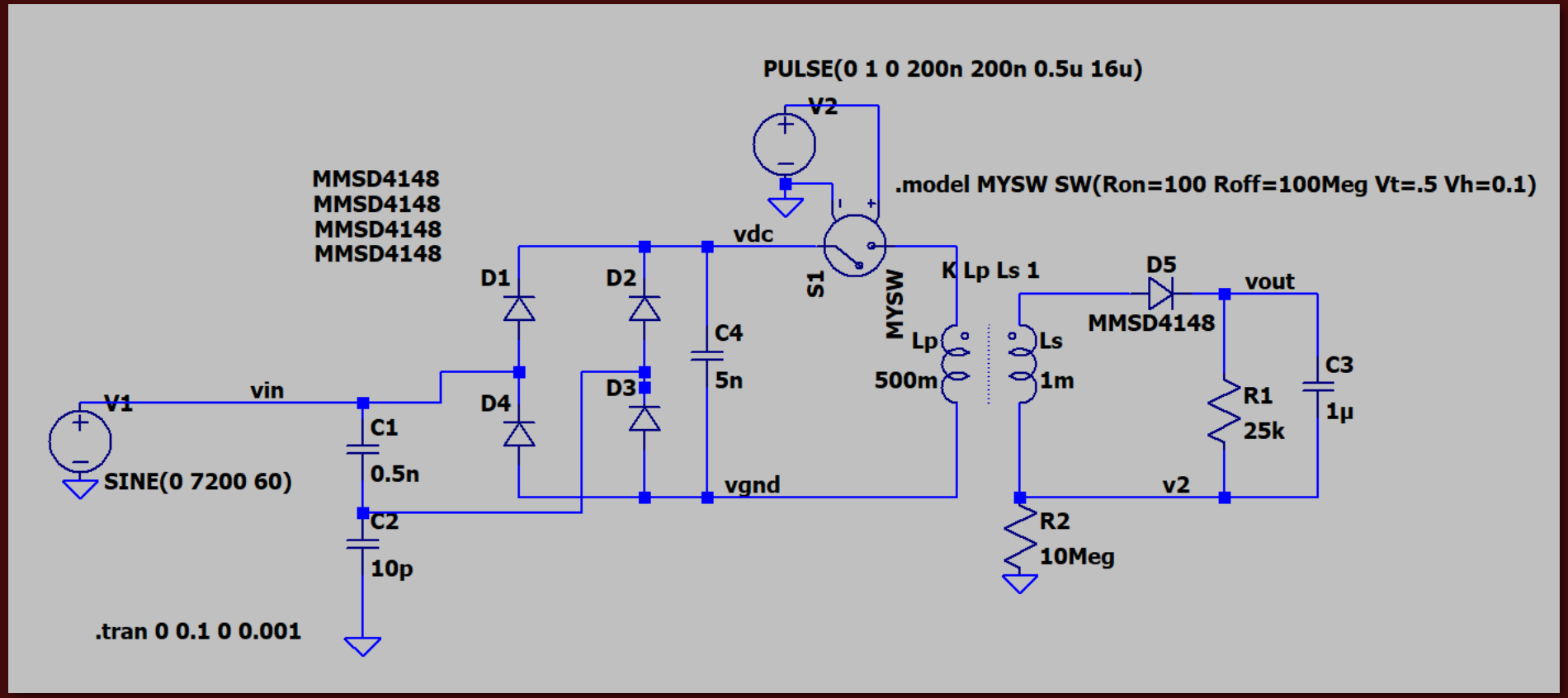
A more effective parametric sweep of switching duty cycle.



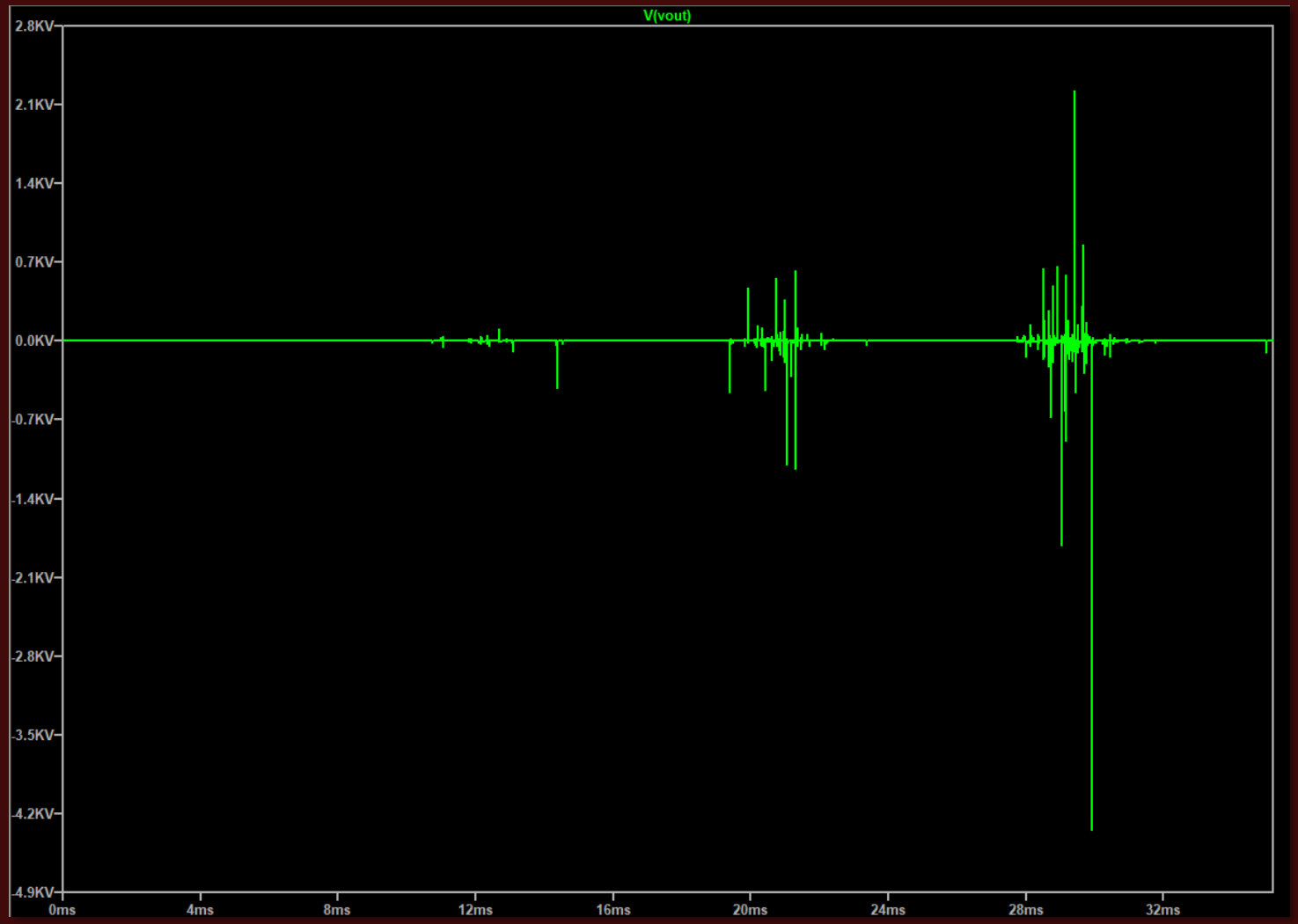
Smaller duty cycles increase power extraction.

Circuit III - Schematic

- Zangl Topology: Taking PWS input off C1 (Harvester Capacitance)
- Much harder to get clean simulations.



Circuit III - Waveforms



Circuit III - Waveforms

- Increasing C_1=35nF, we can get V_{out}=1.91mV, I_L=75.95nA, P_{out}=145pW