

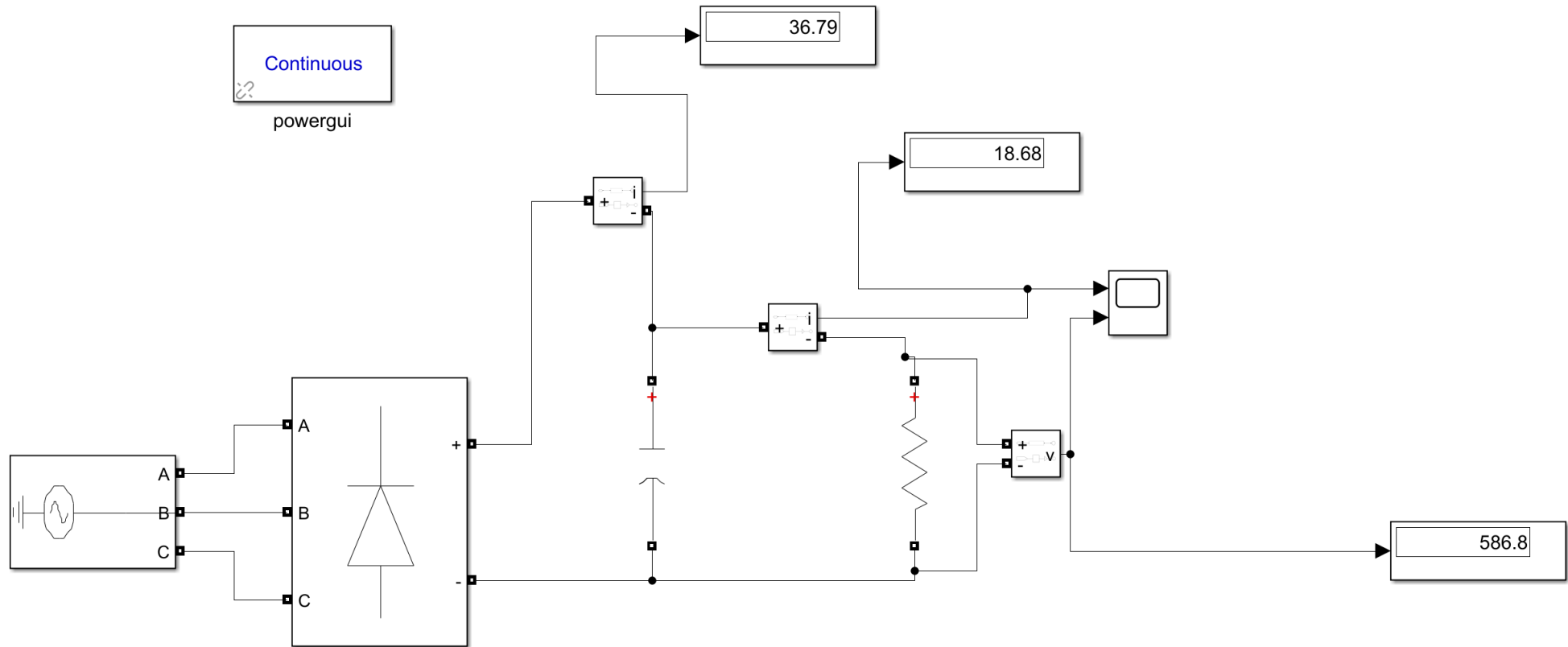
EN 659: Energy Efficient Industrial Drives

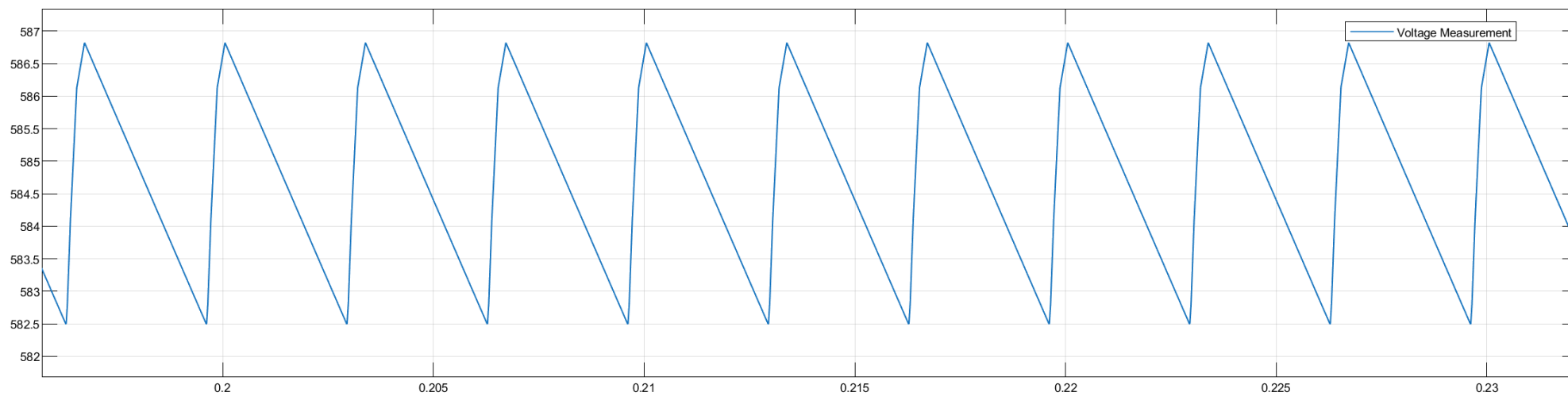
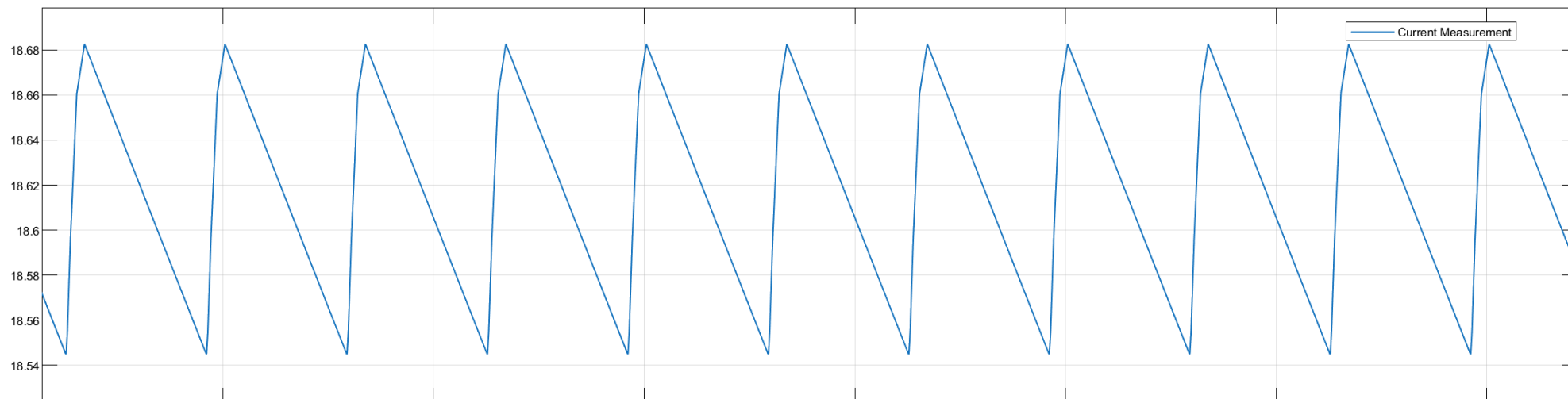
Assignment – 1

Submitted by: Aditya Kumar
(24M1355)

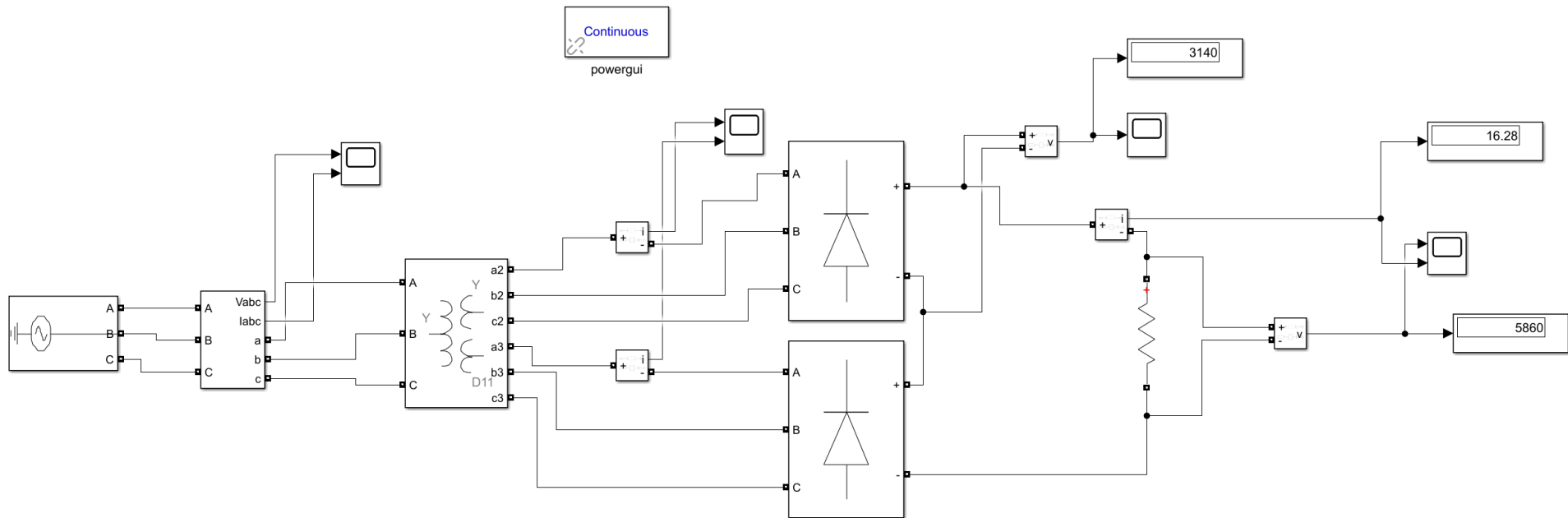
AC-DC Rectifiers

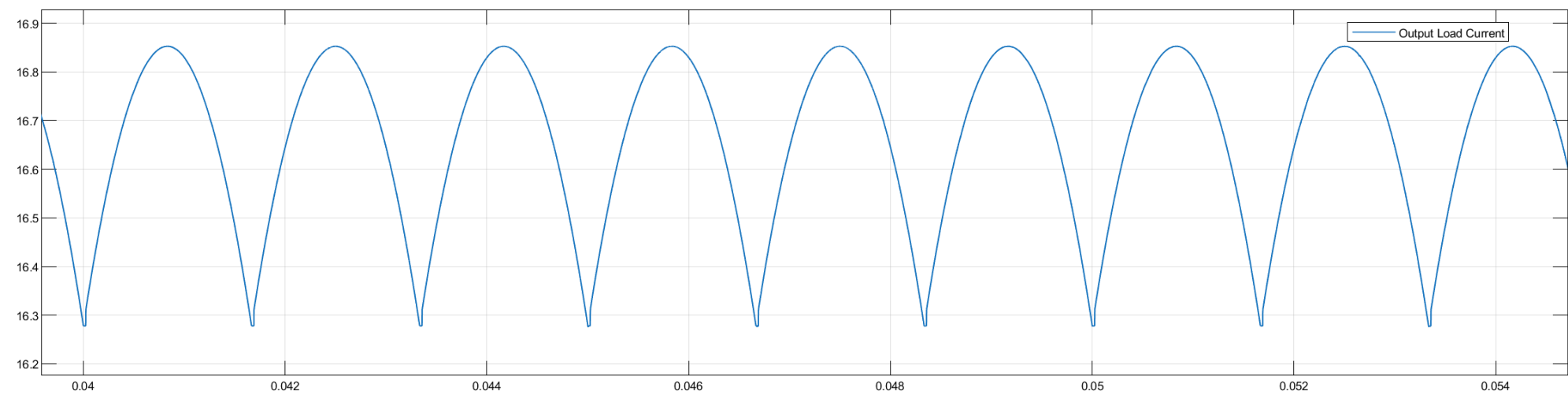
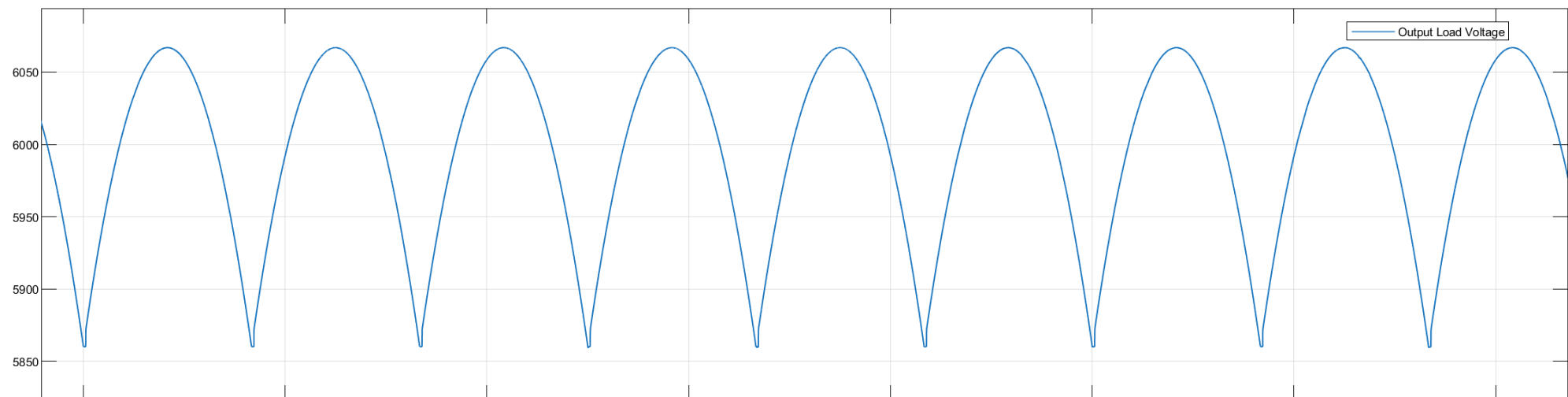
Q.1 (a) Three-phase 6-pulse diode rectifier with C-filter and R-load:

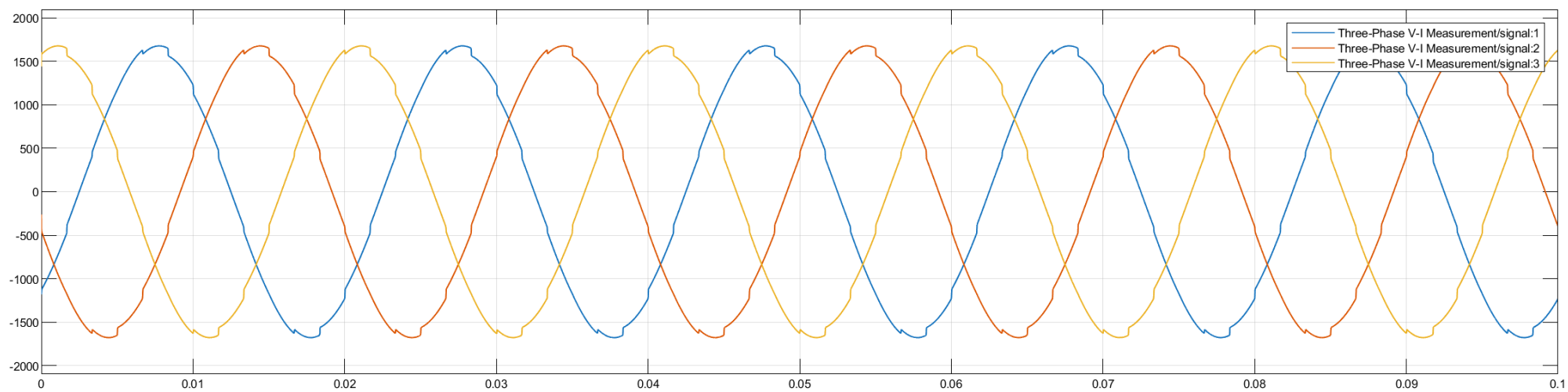
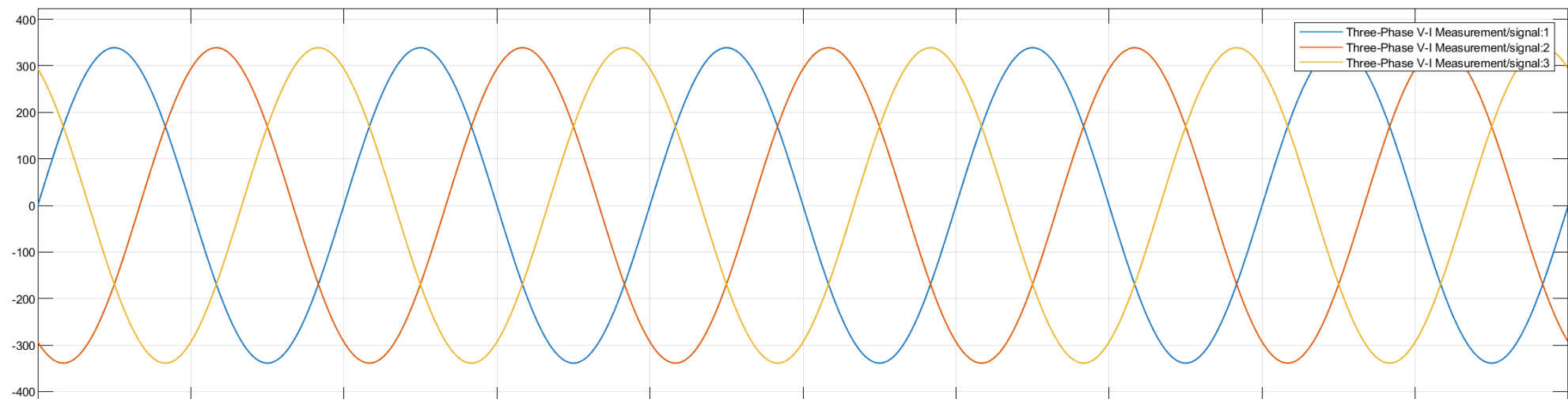




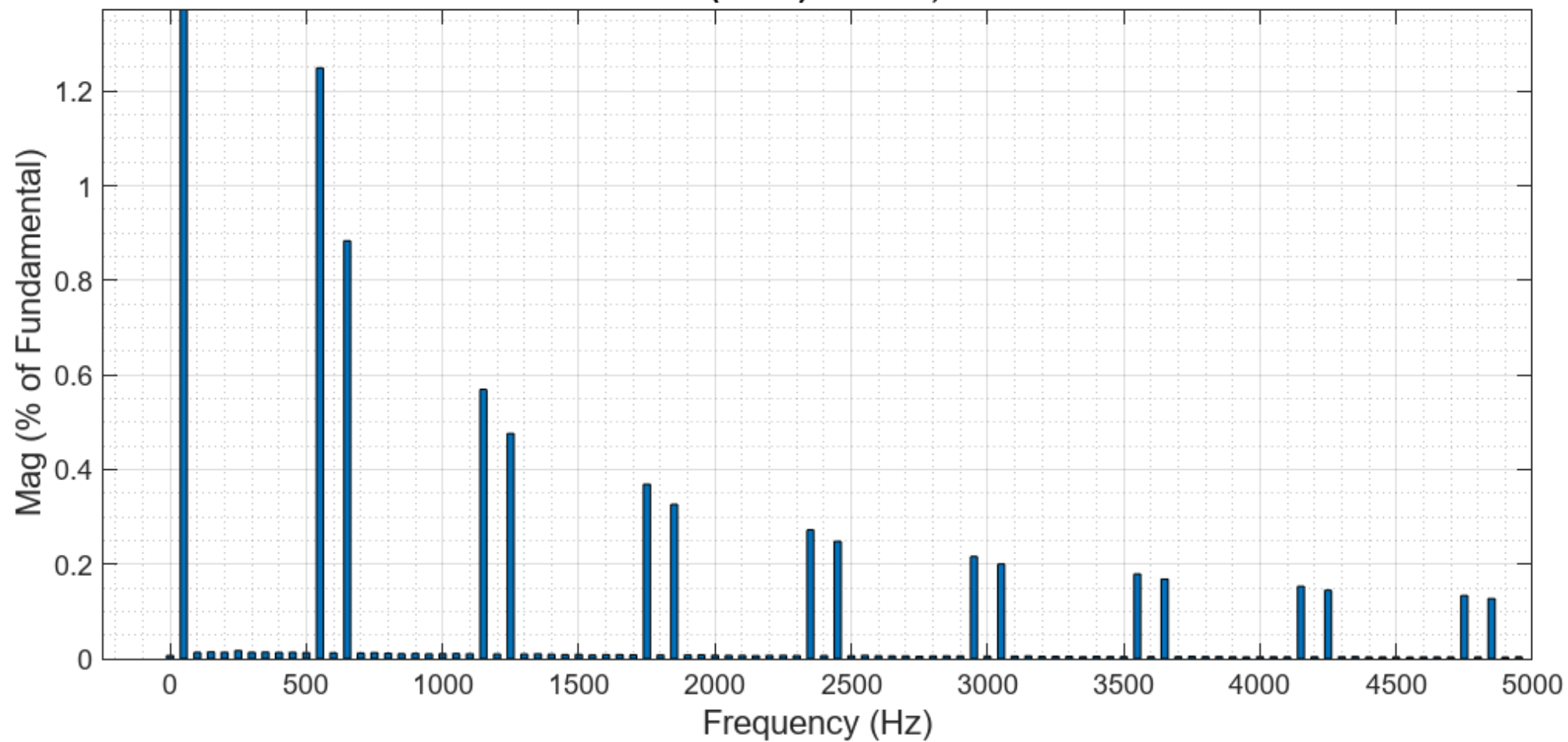
Q.1 (b) Three-phase 12-pulse series-type diode rectifier without C-filter and R-load:







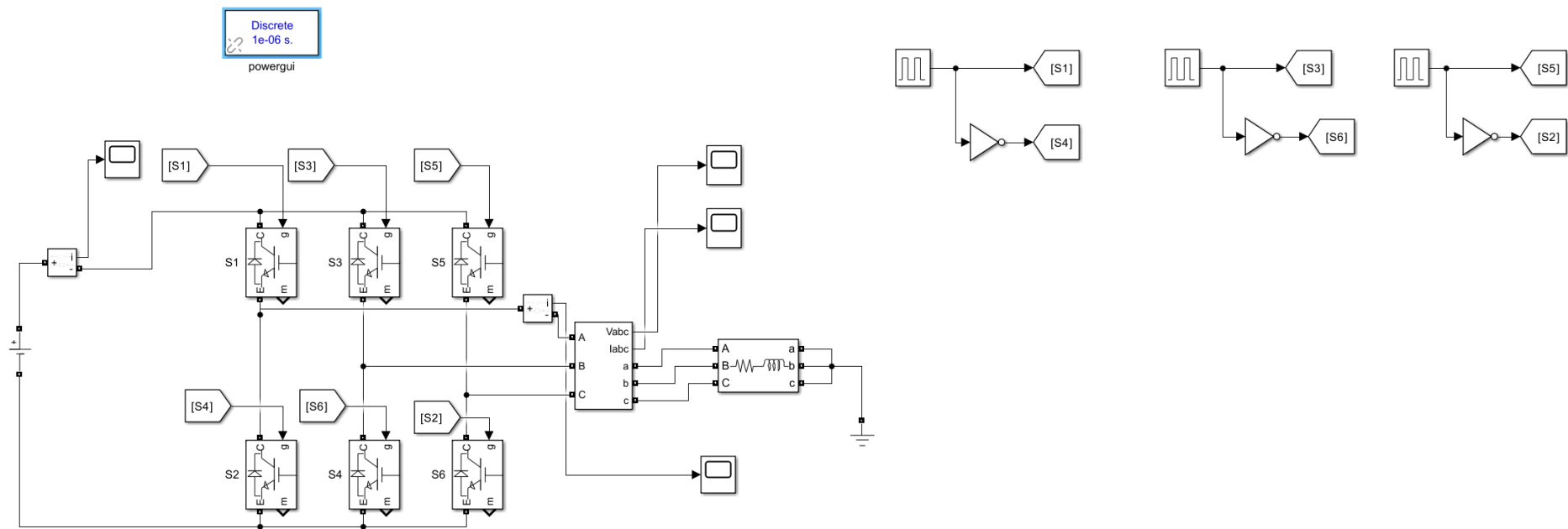
Fundamental (50Hz) = 1532 , THD= 1.94%

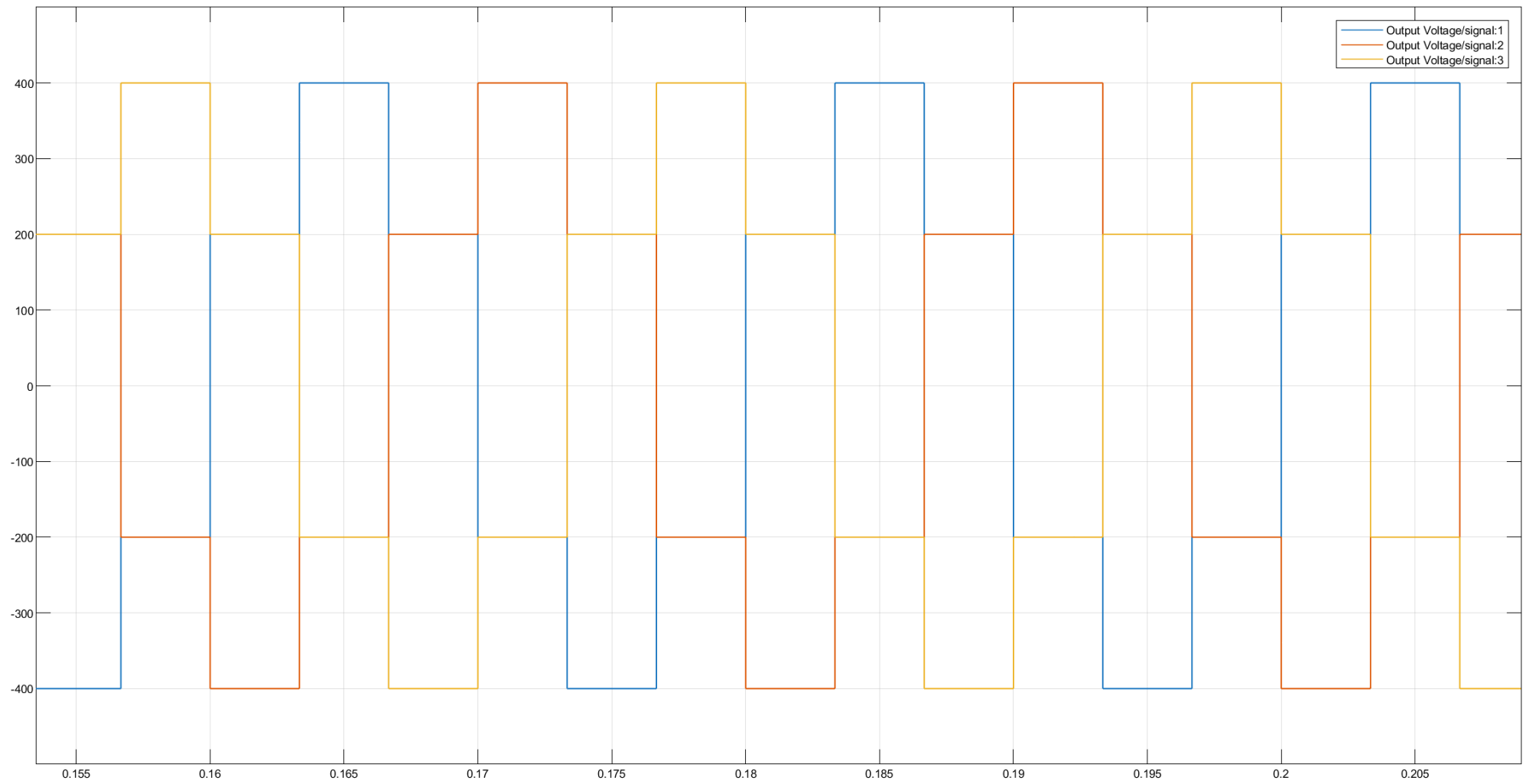


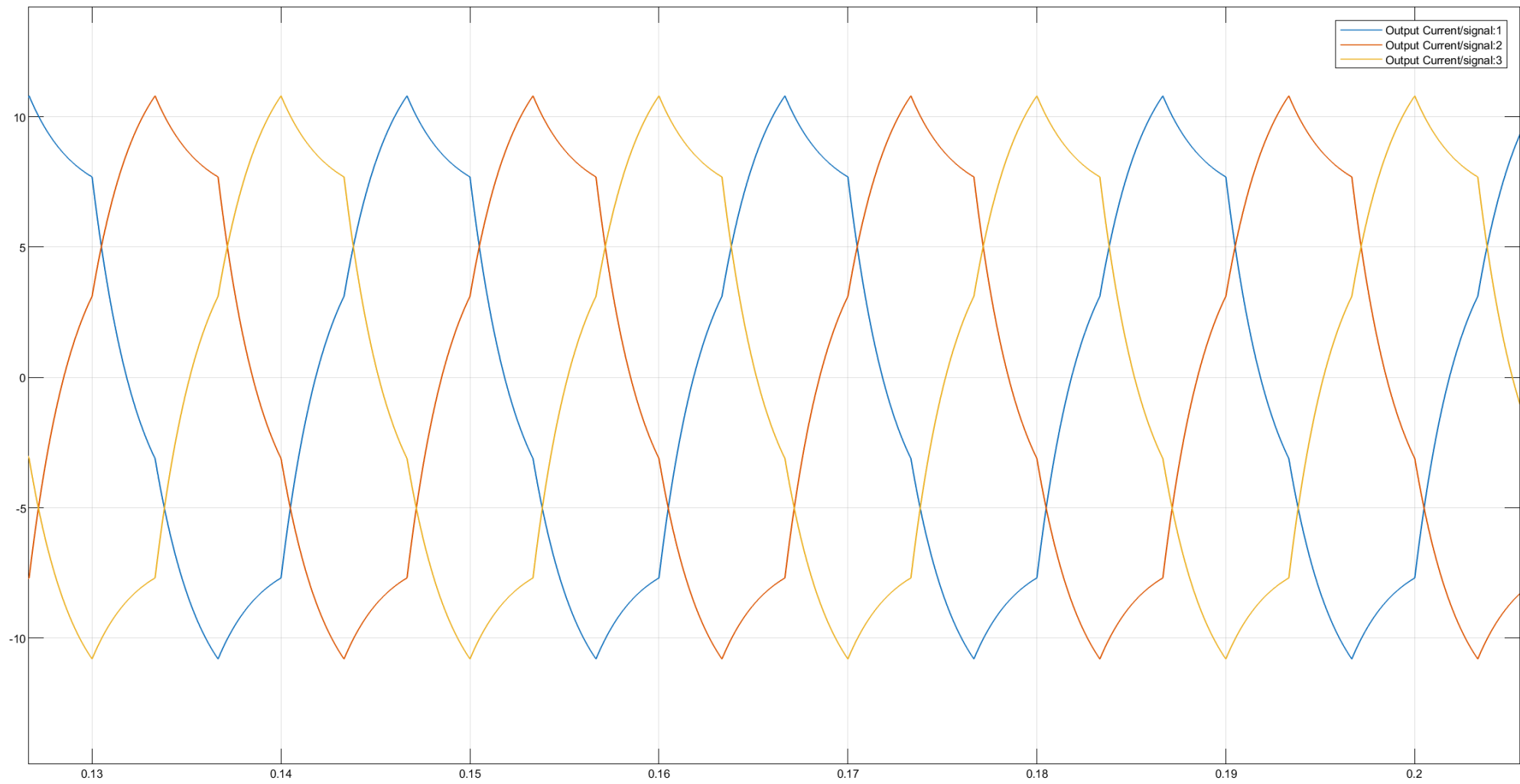
DC-AC Inverters

Q.2 (a) Three-phase two-level voltage source inverter (with constant DC voltage source as input):

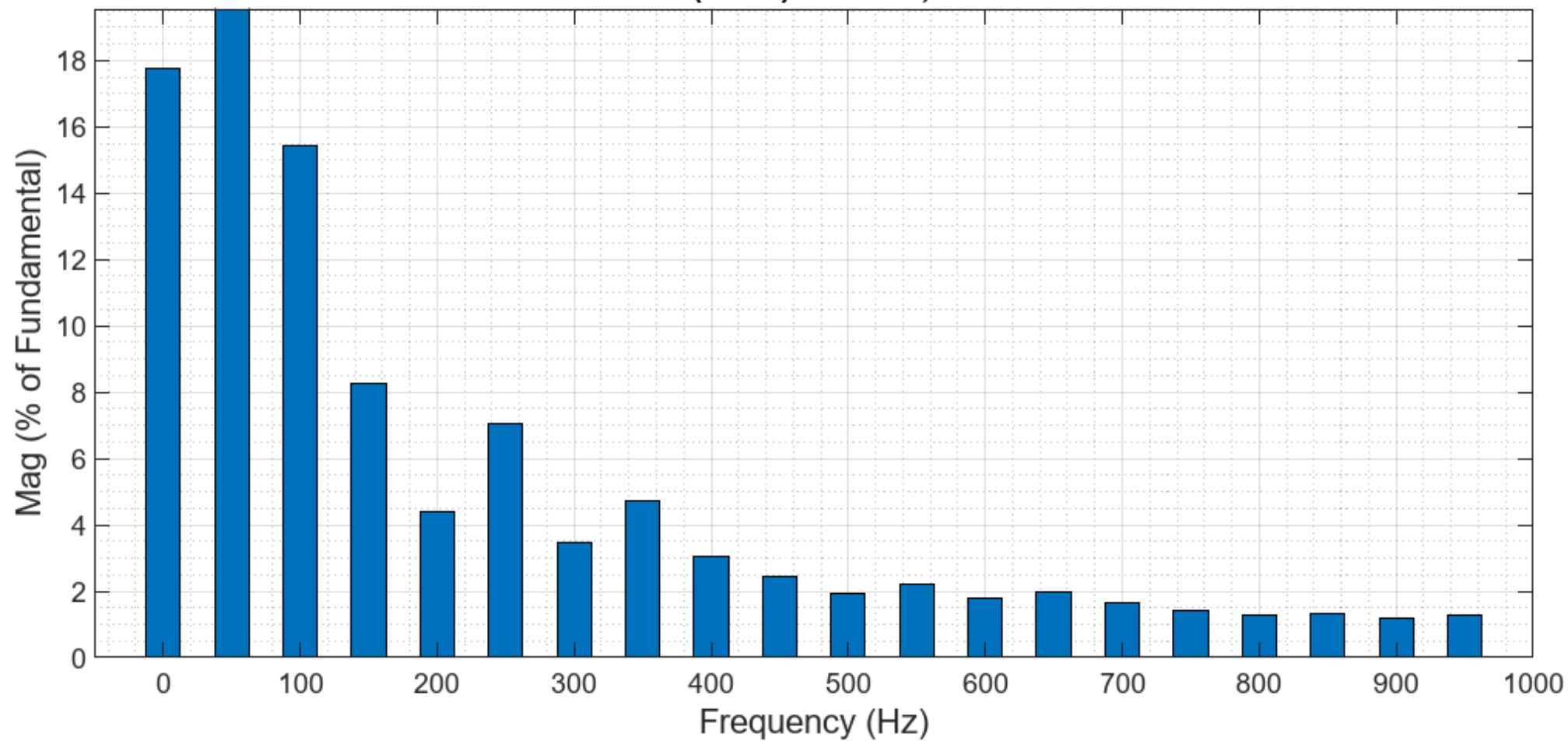
(i) Square wave operation:



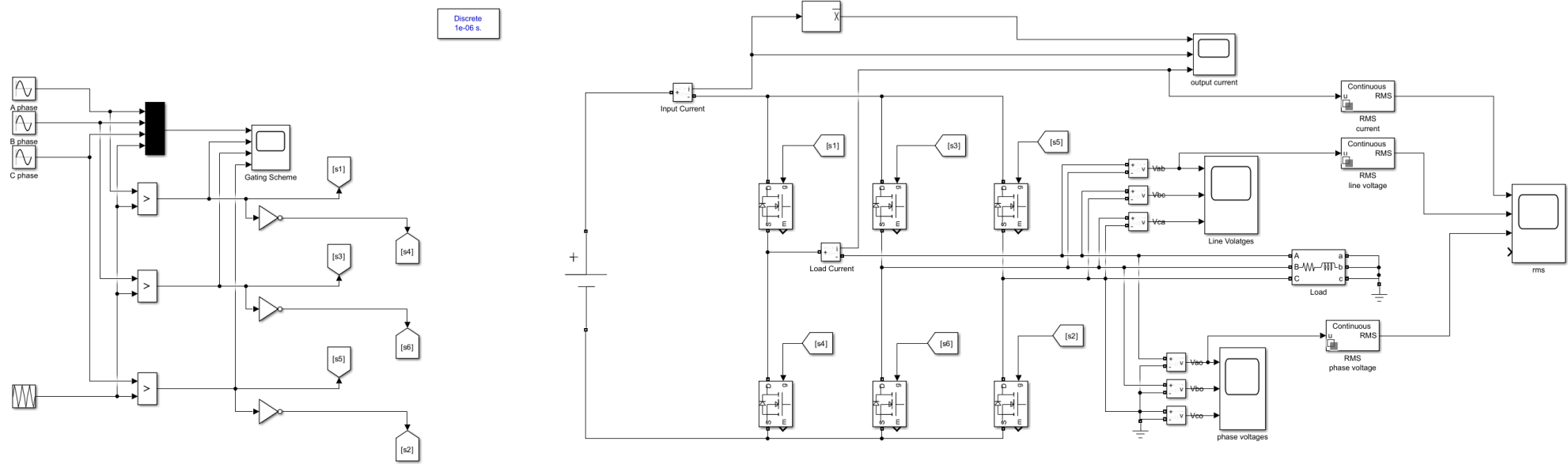


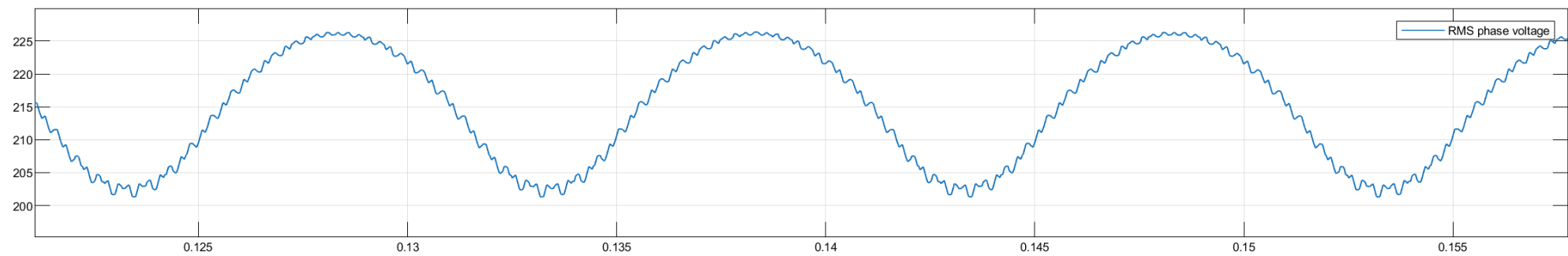
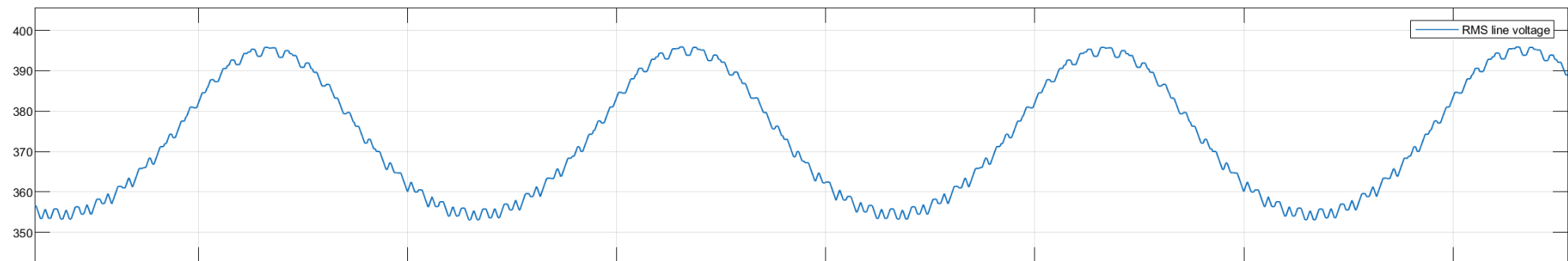
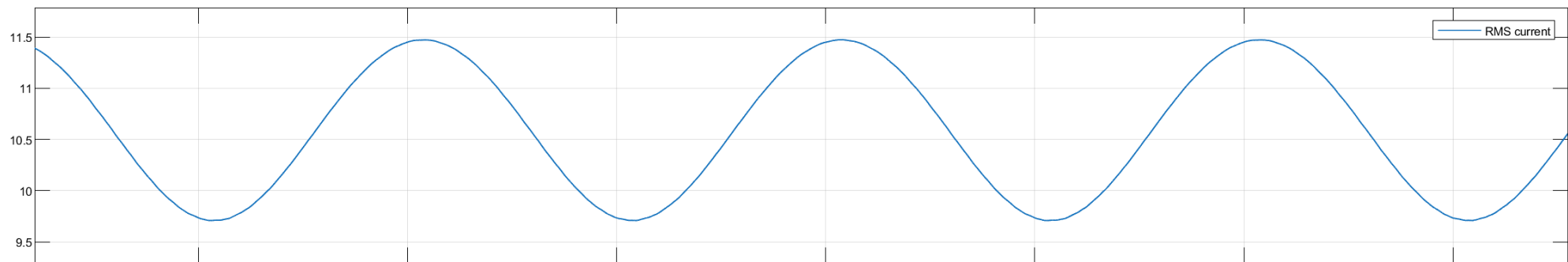


Fundamental (50Hz) = 11.42 , THD= 21.81%

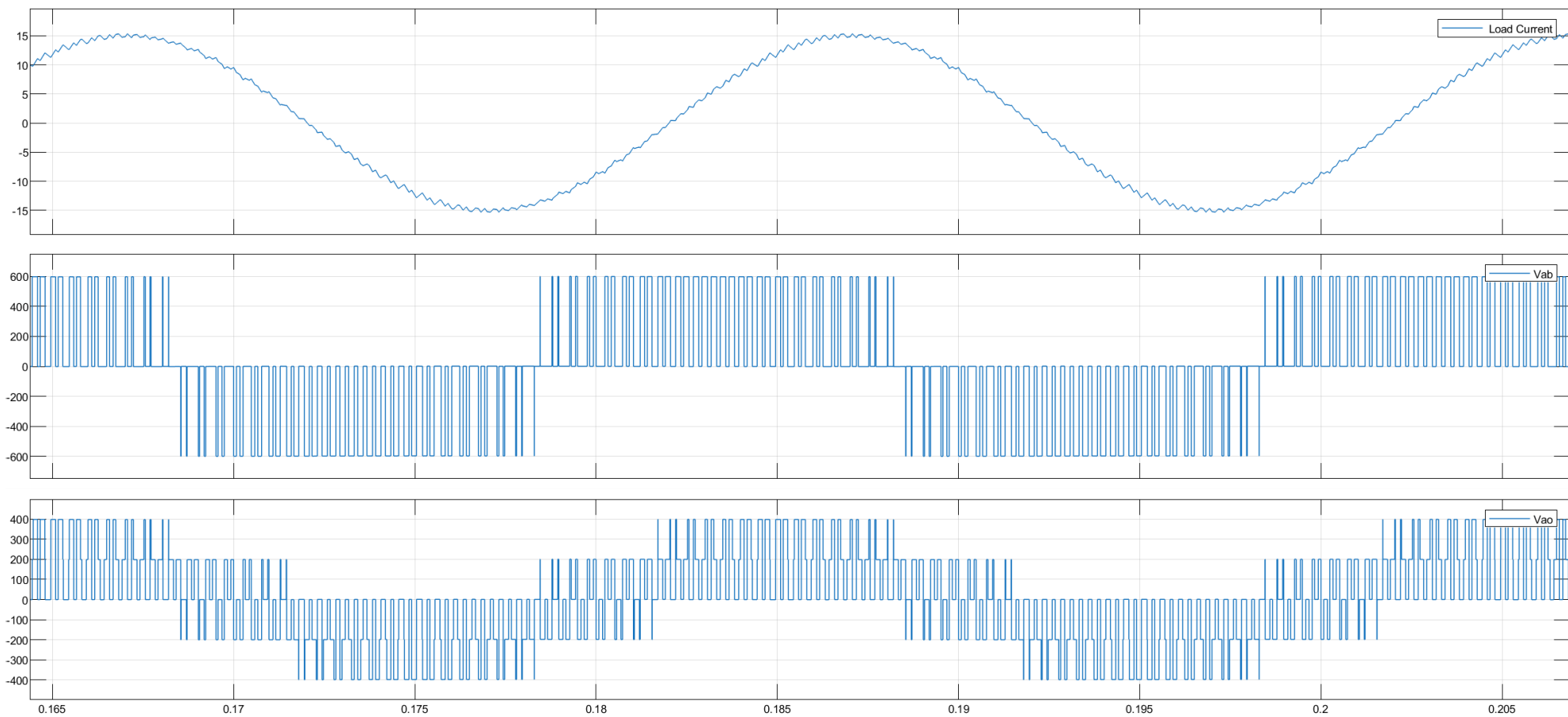


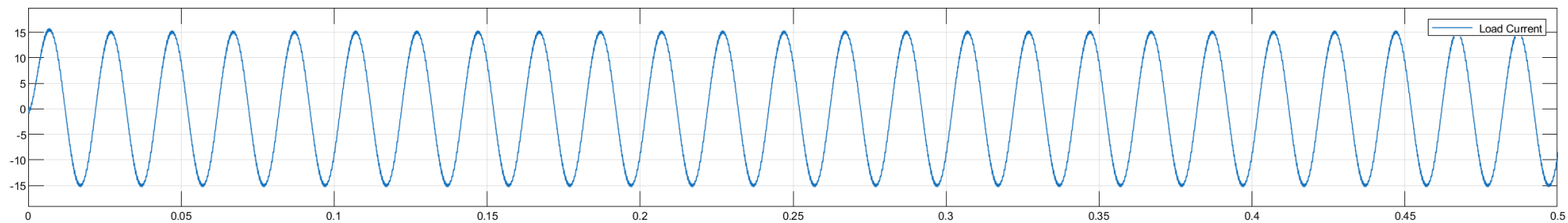
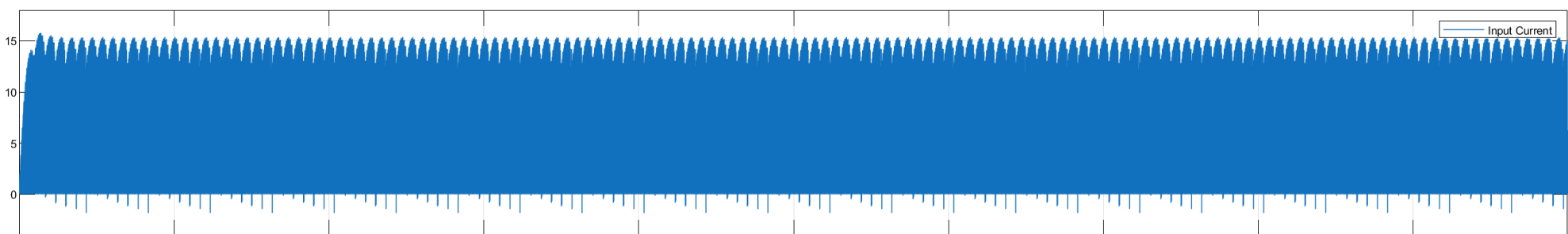
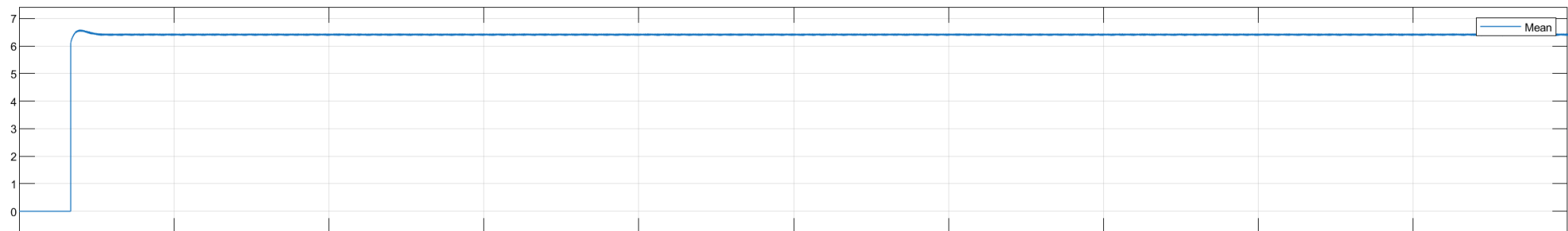
(ii) Sine-triangle PWM Operation:



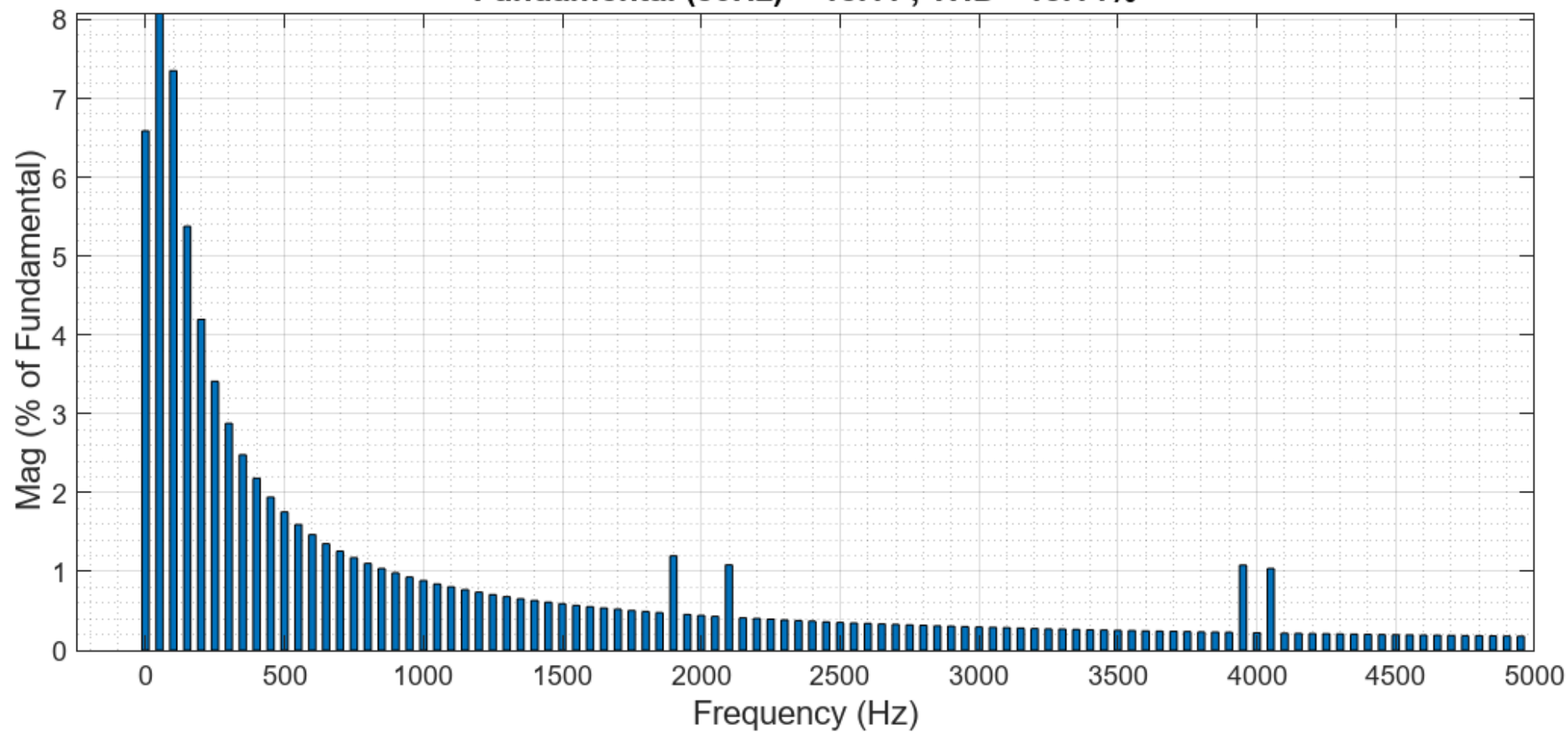


Offset=0



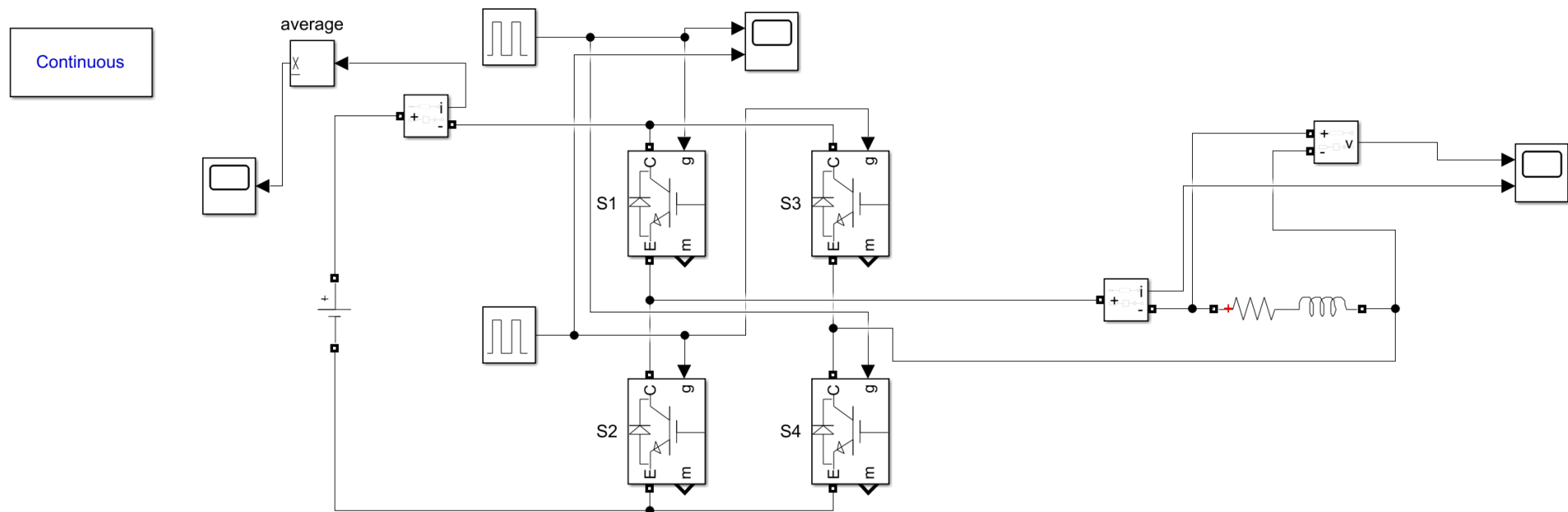


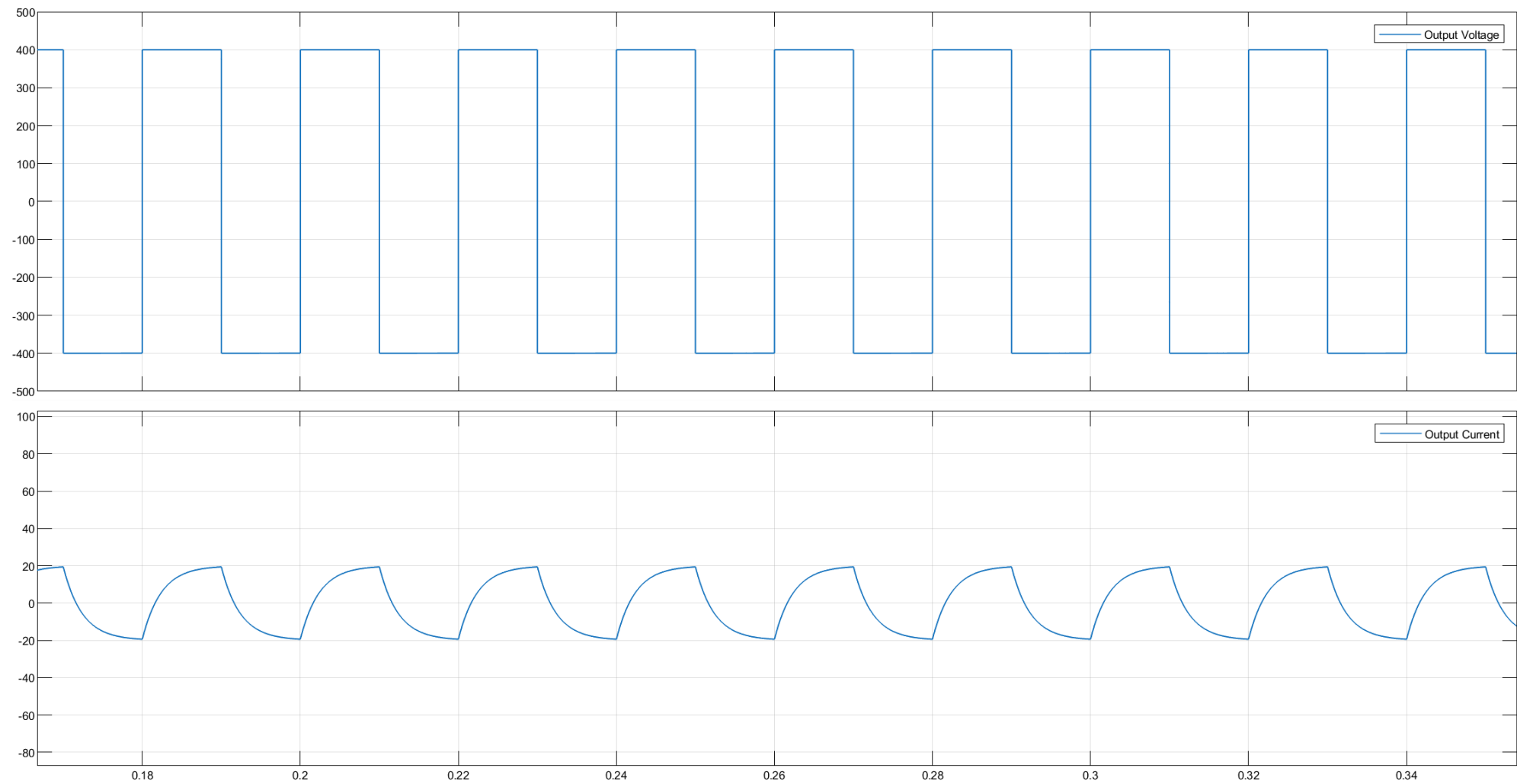
Fundamental (50Hz) = 15.11 , THD= 13.14%

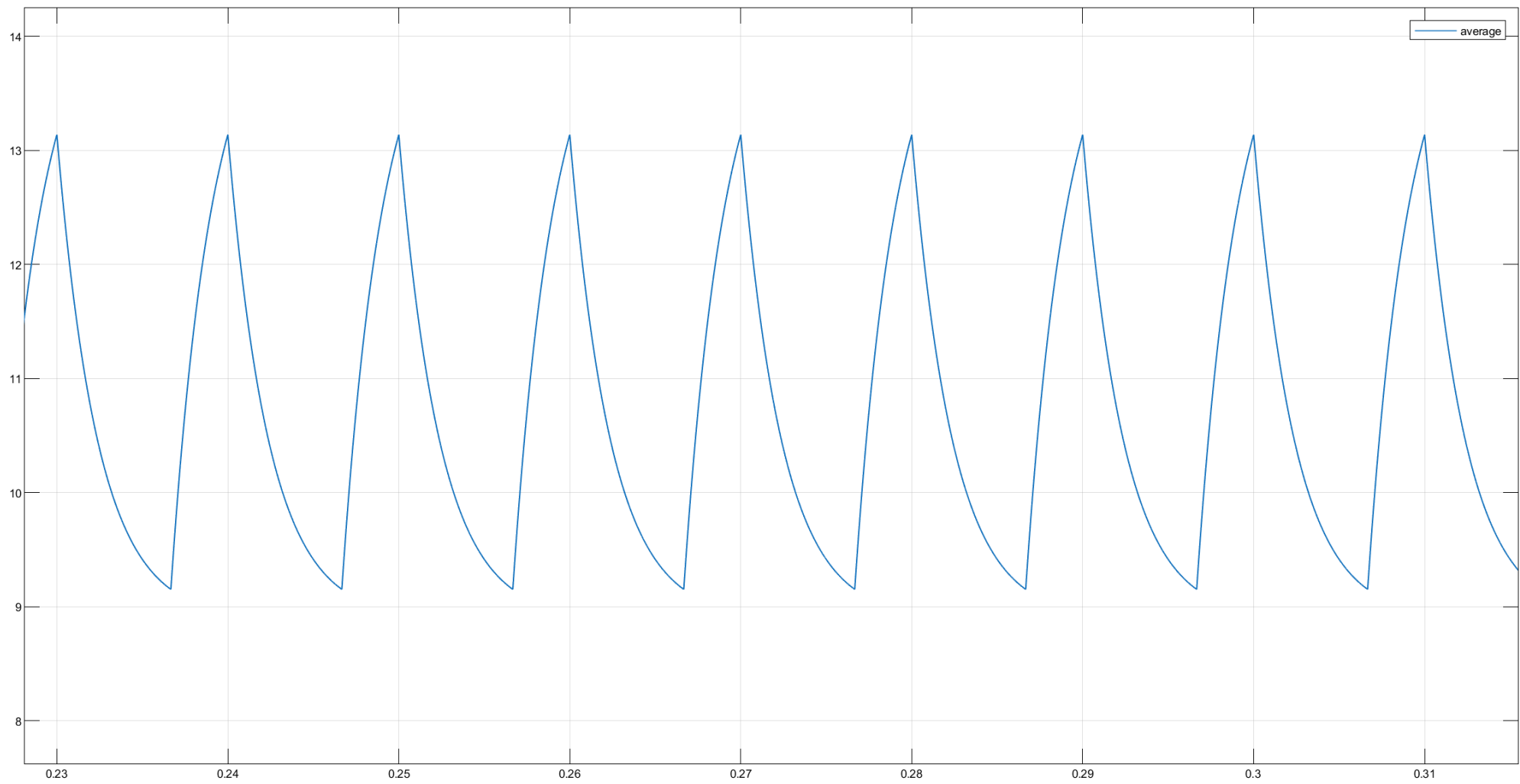


Q.2 (b) Single-phase / H-Bridge two-level voltage source inverter (with constant DC voltage source as input):

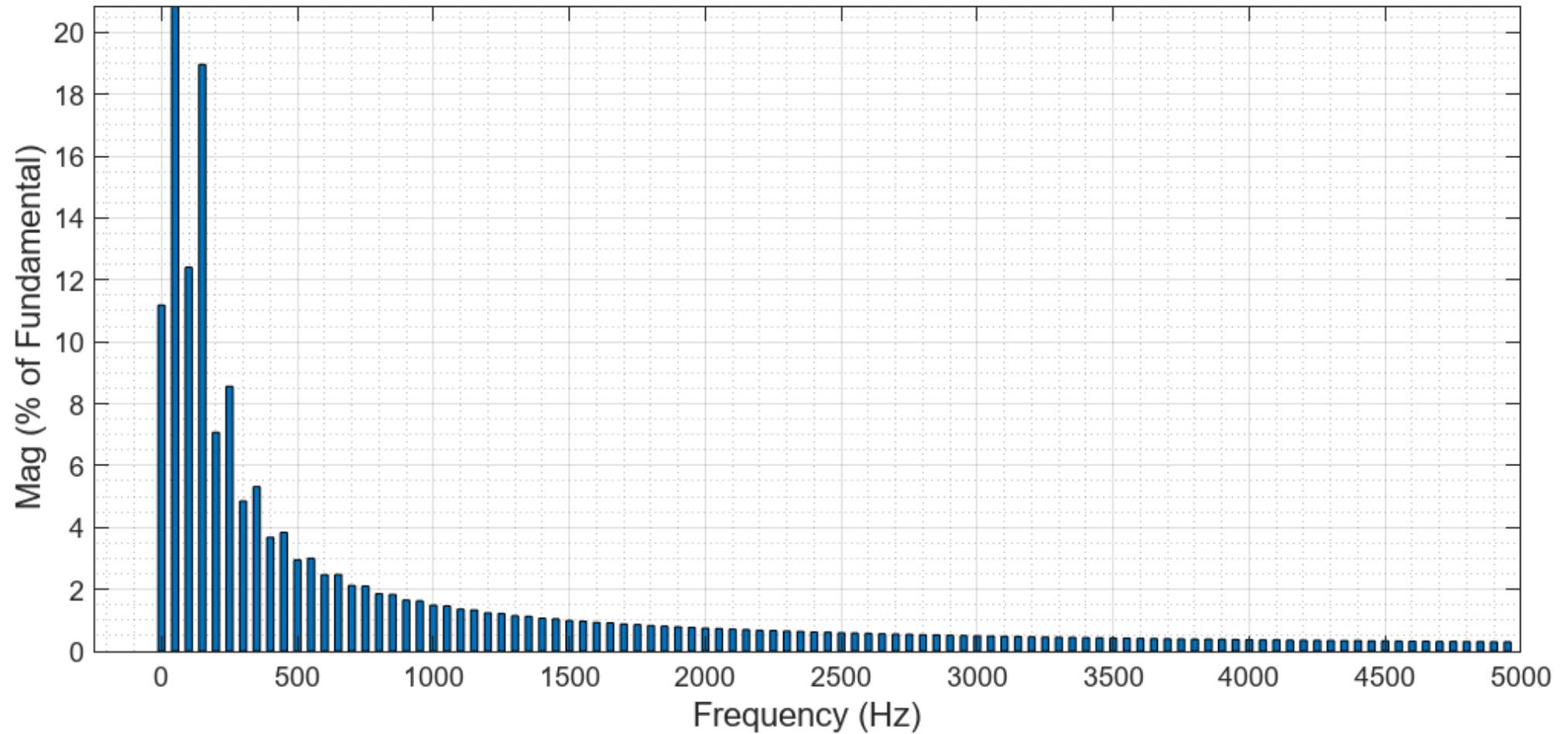
(i) Square wave operation:



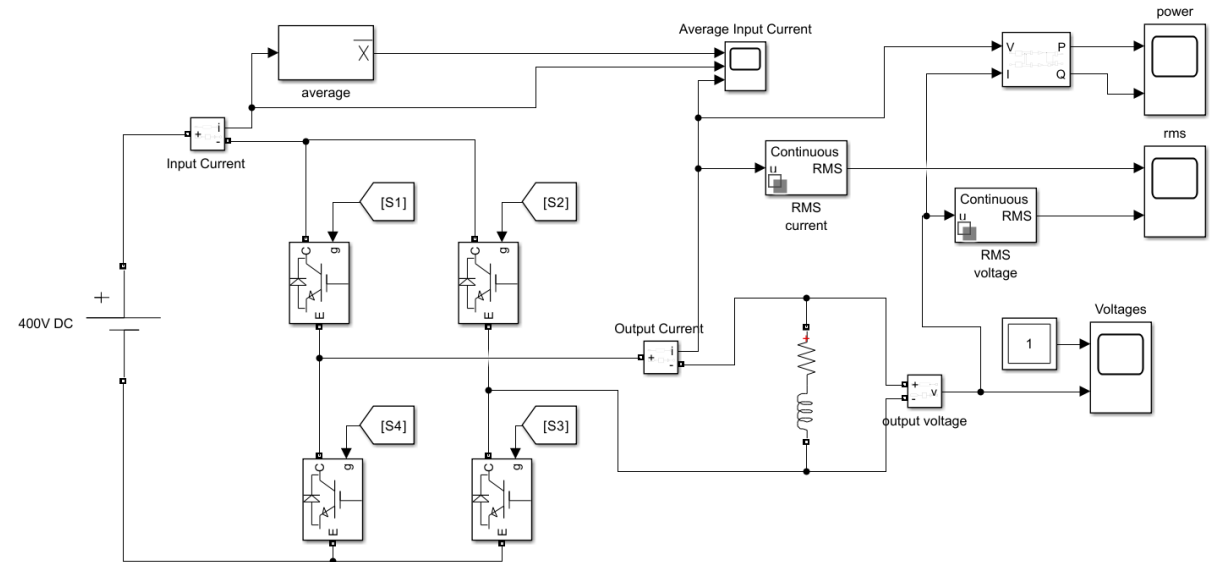
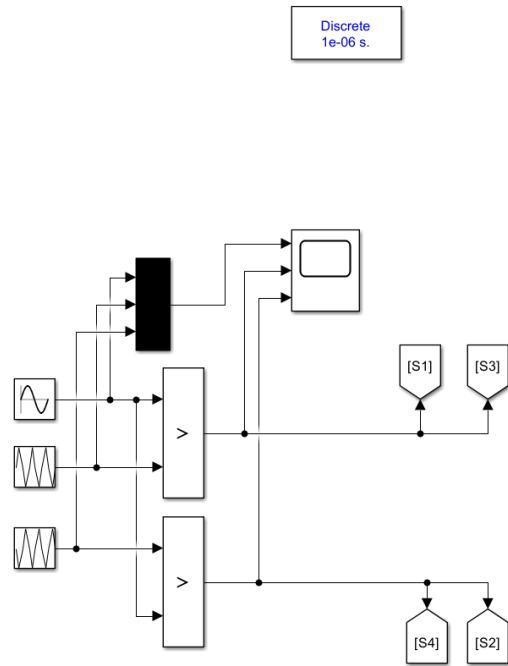


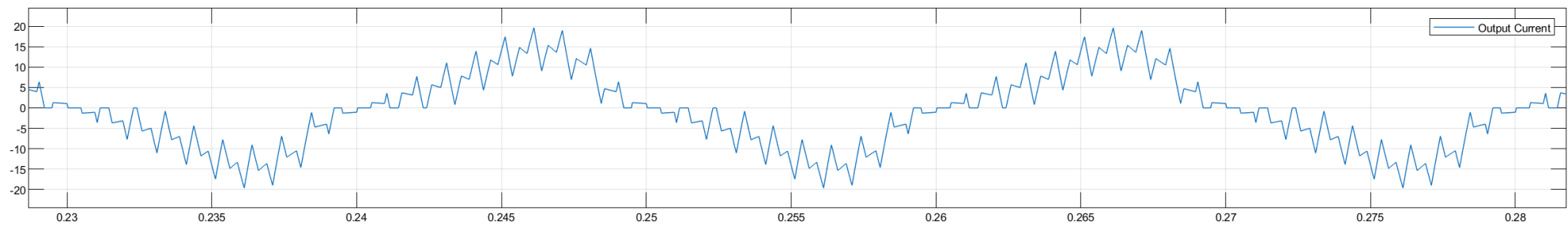
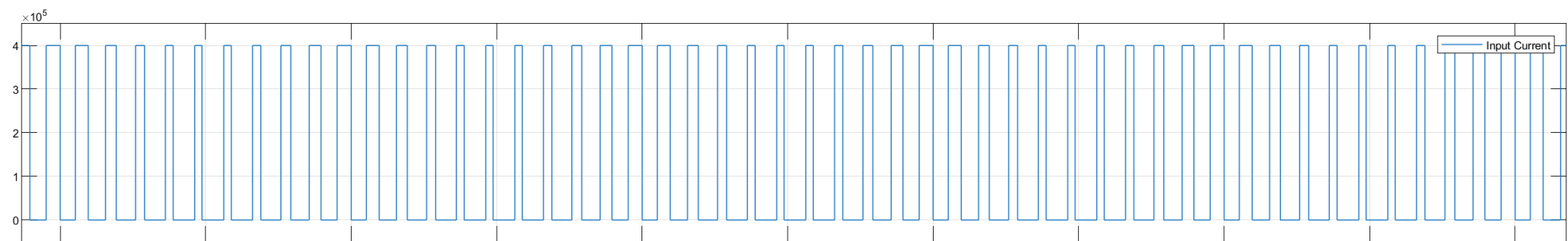
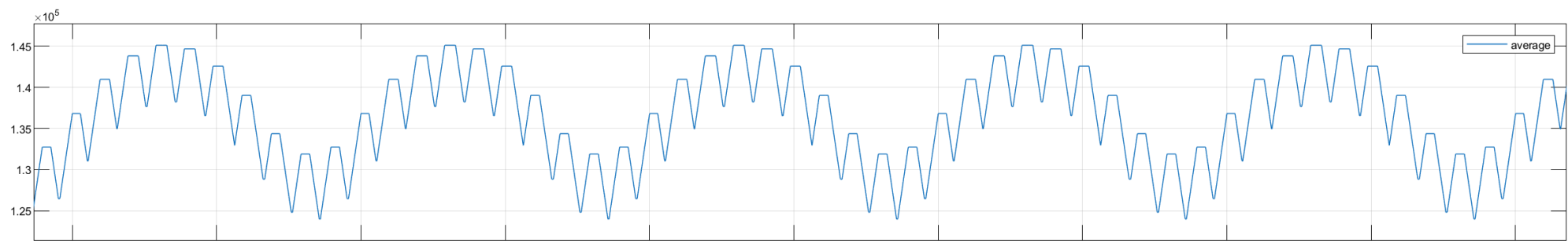


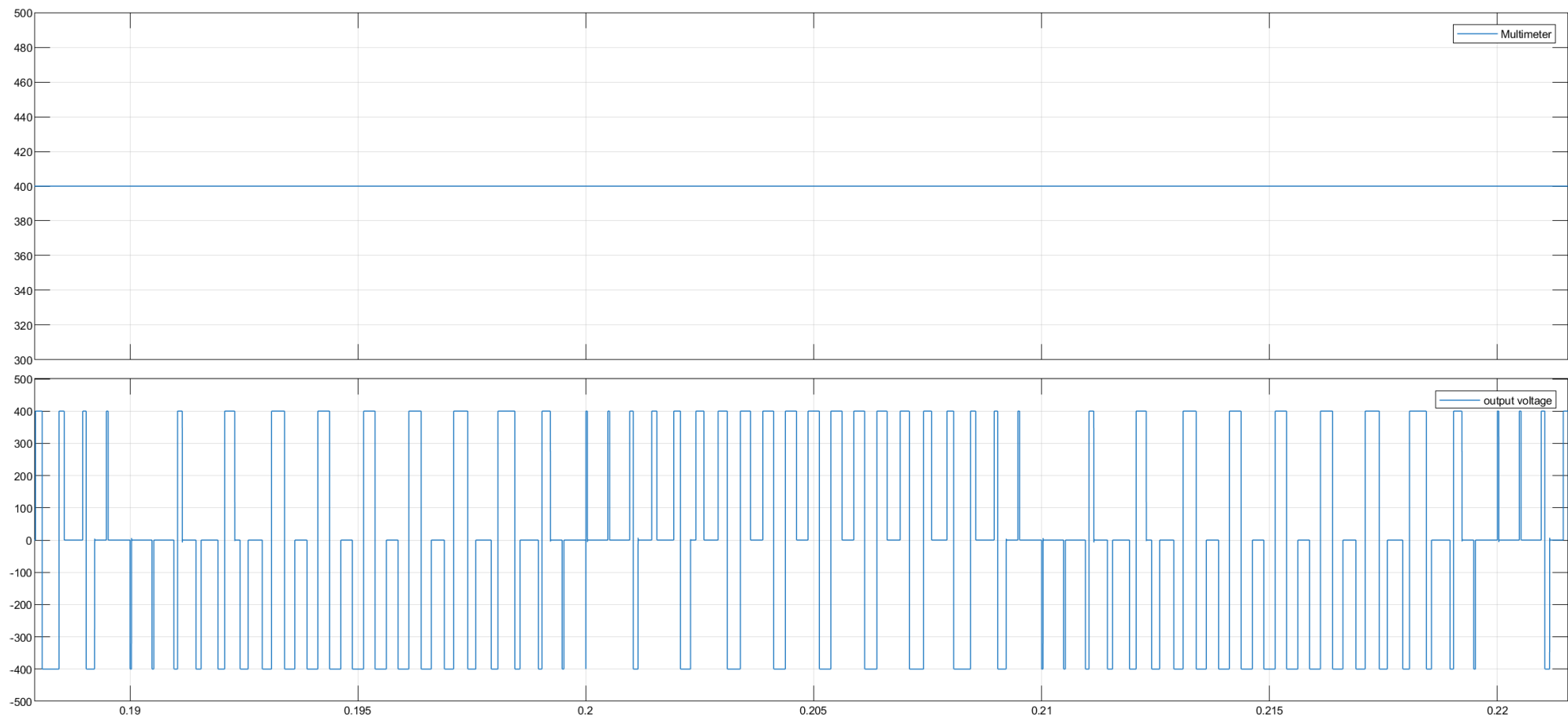
Fundamental (50Hz) = 20.7 , THD= 28.53%

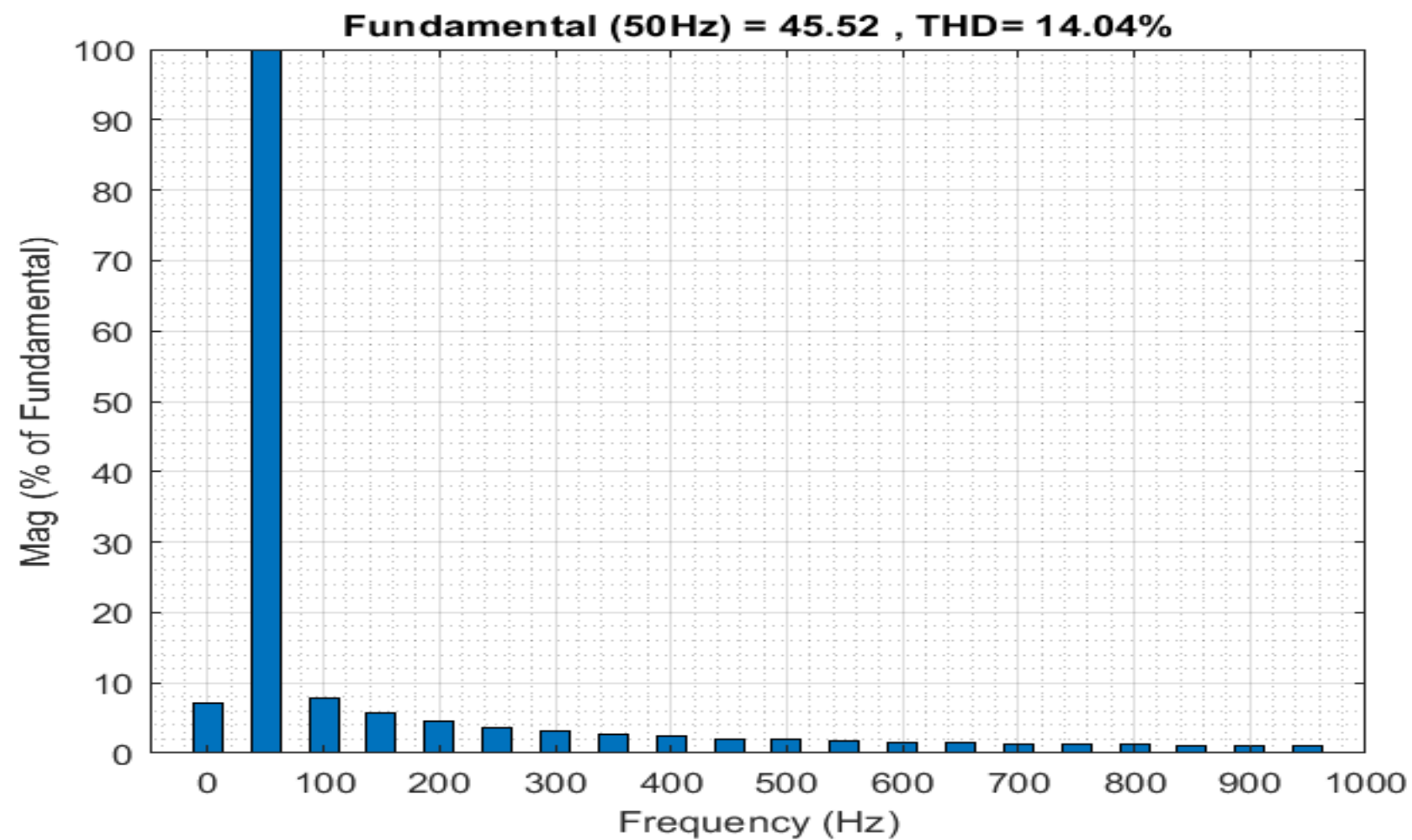


(ii) Sine triangle PWM operation:

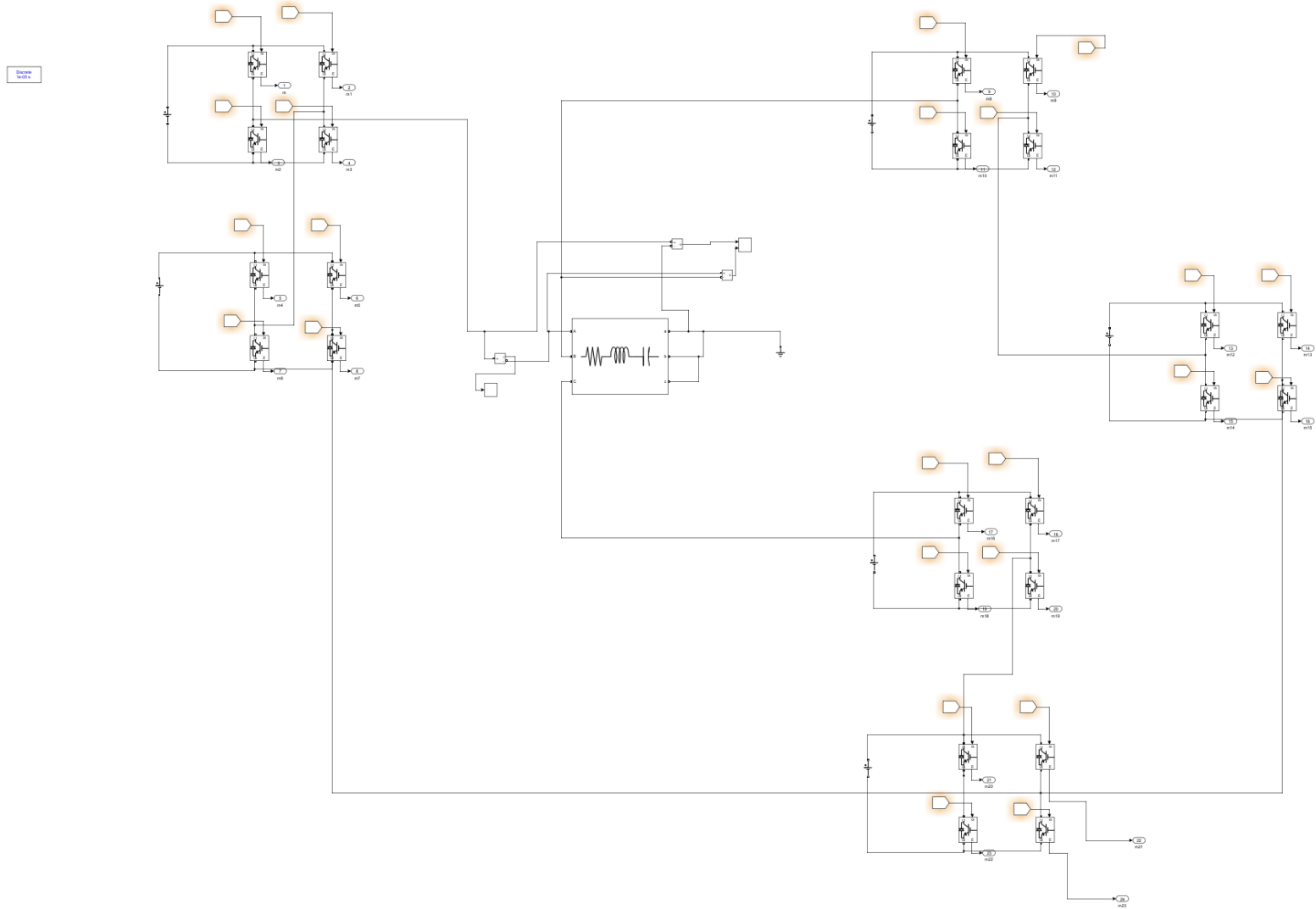
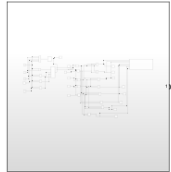
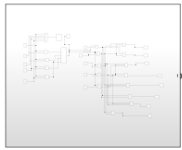


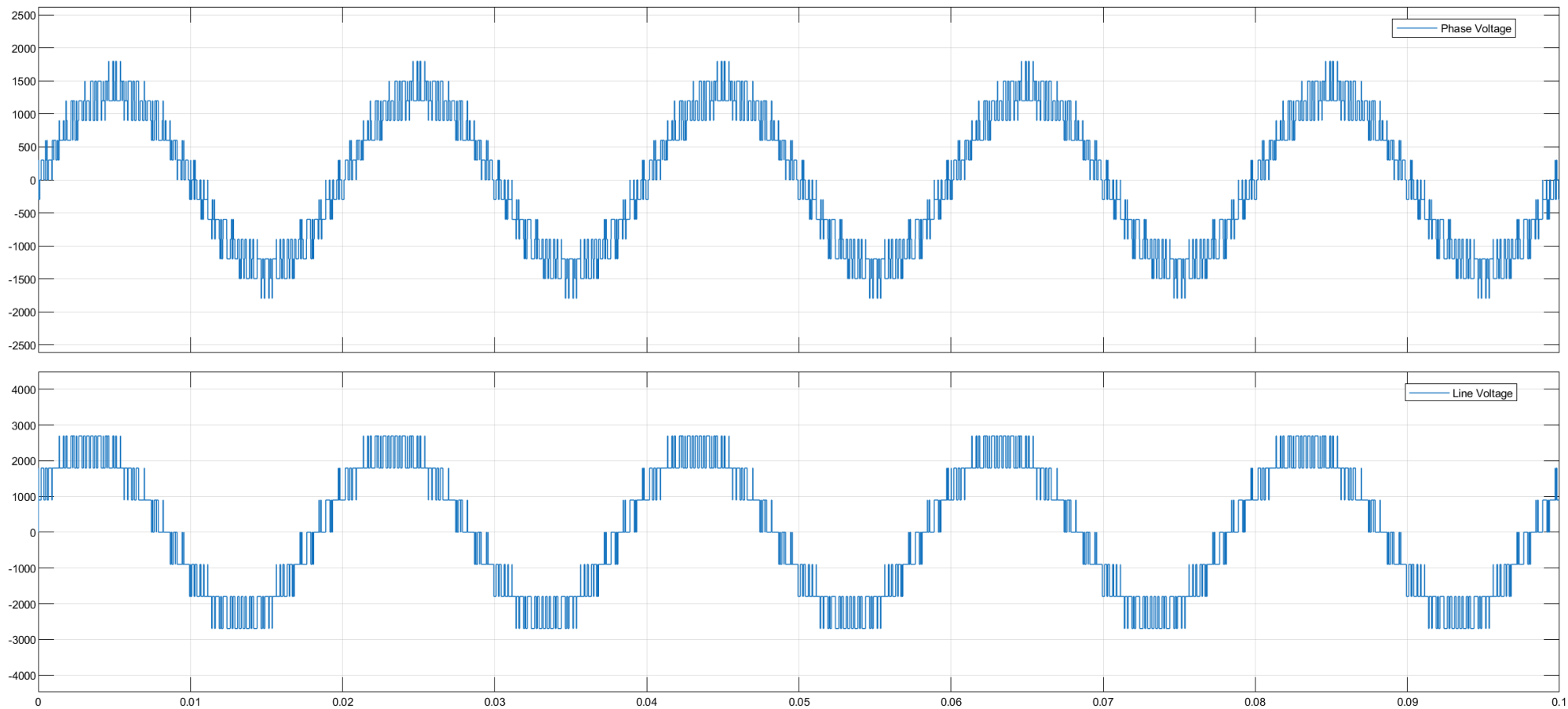


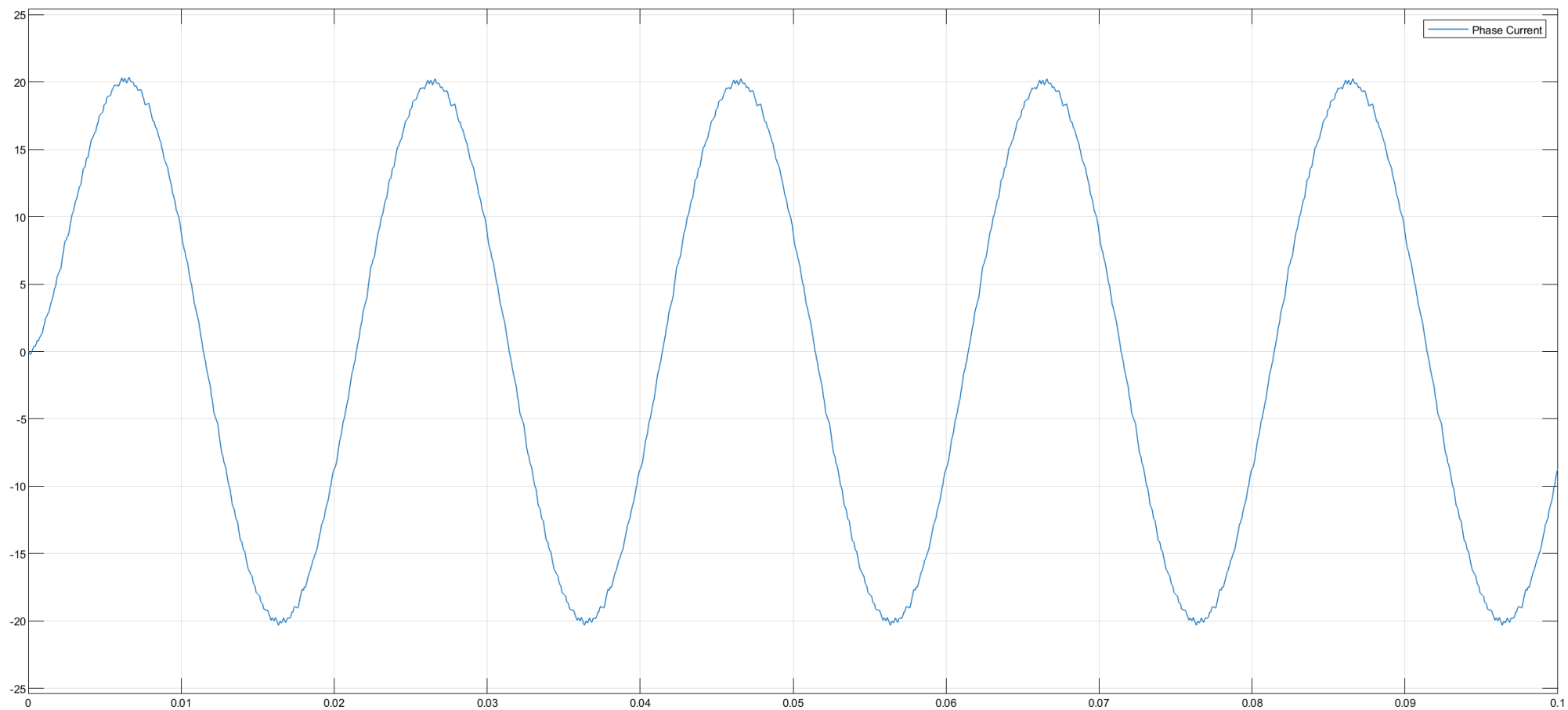




Q.2 (c) Cascaded H-Bridge five-level voltage source inverter (with constant DC voltage sources as input)







Fundamental (50Hz) = 20.05 , THD= 9.45%

