



NPTEL ONLINE CERTIFICATION COURSES

DIGITAL CONTROL IN SMPCs AND FPGA-BASED PROTOTYPING

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Module 03: MATLAB Custom Model Development under Digital Control

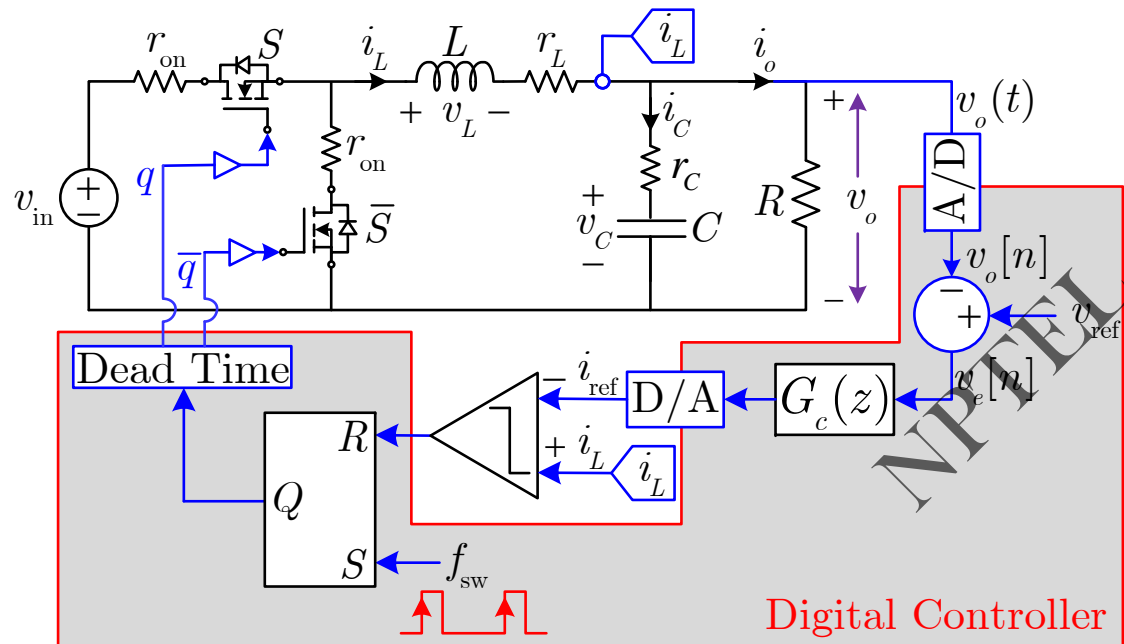
Lecture 27: MATLAB Model Development for Fully Digital Current Mode Control



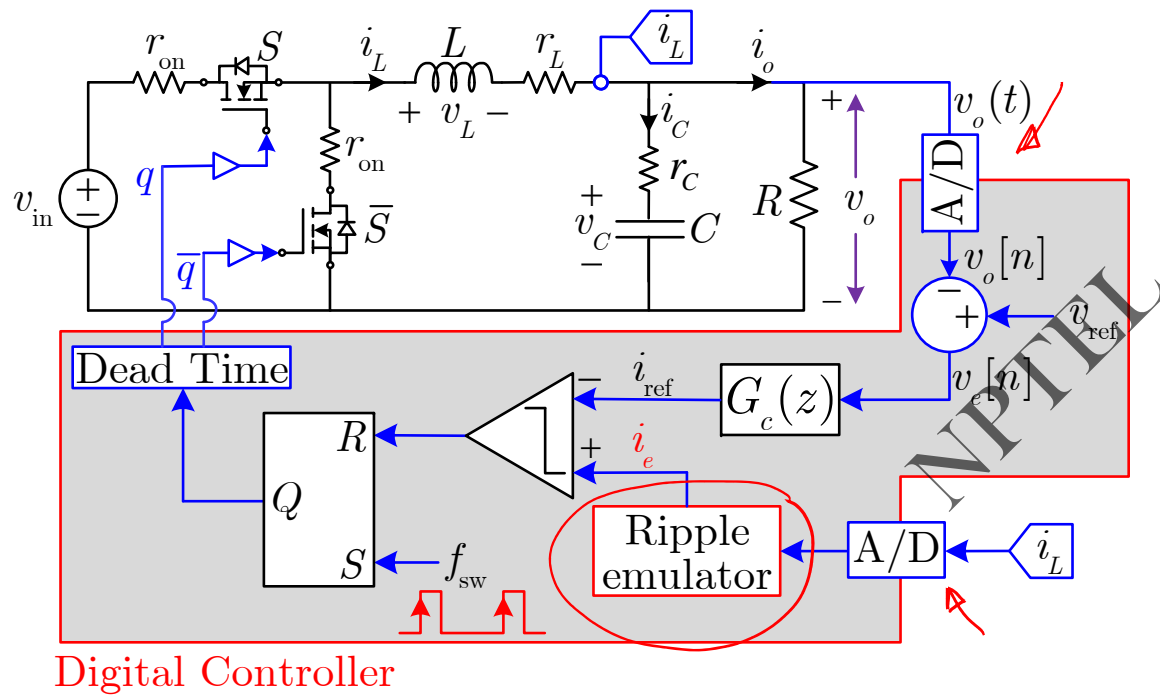
CONCEPTS COVERED

- Custom MATLAB model development for fully digital current mode control
- MATLAB simulation studies

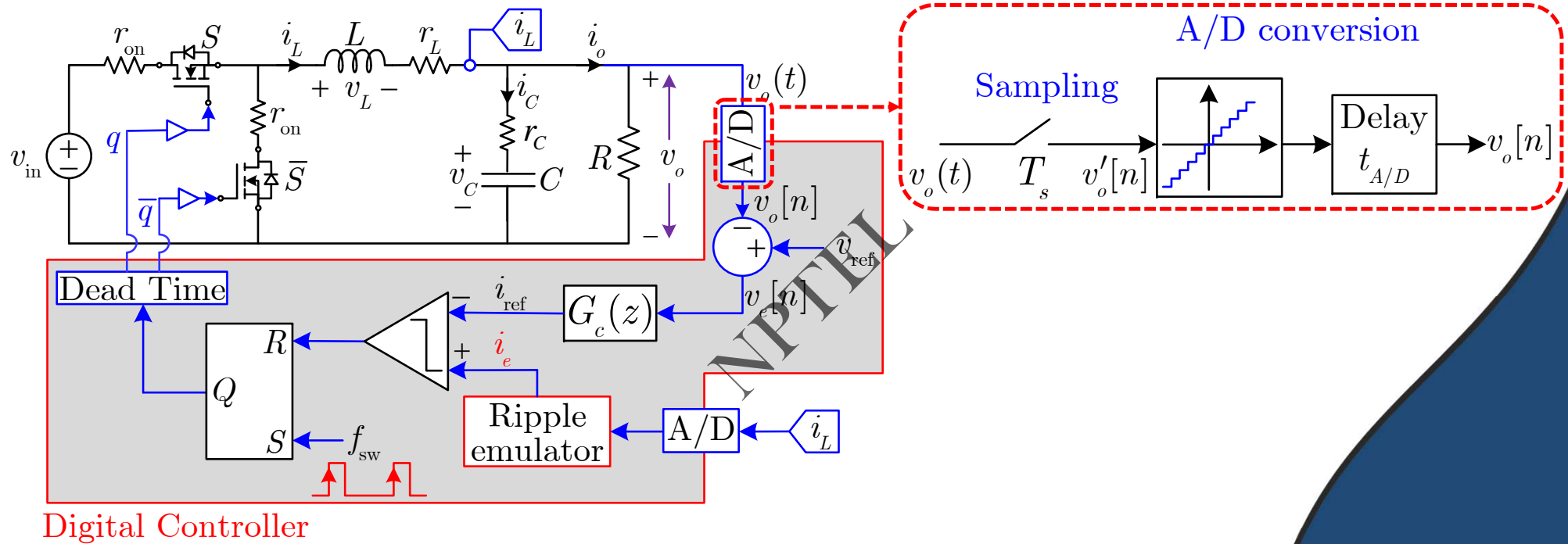
Fixed Frequency Mixed Signal Peak CMC



Fixed Frequency Fully Digital Peak CMC

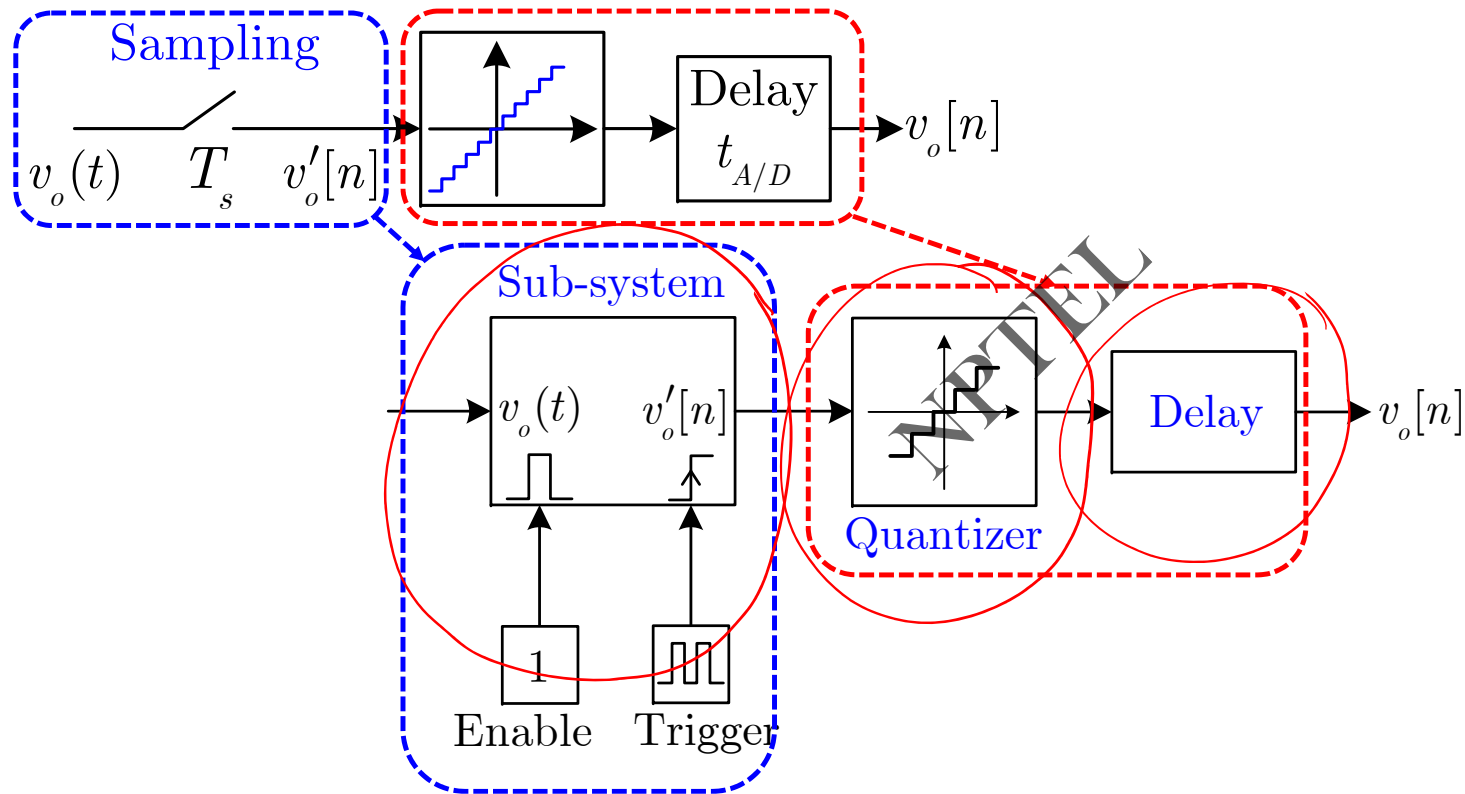


ADC

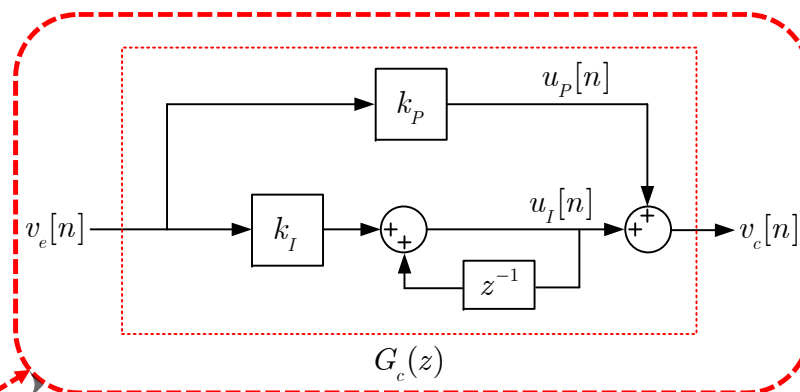
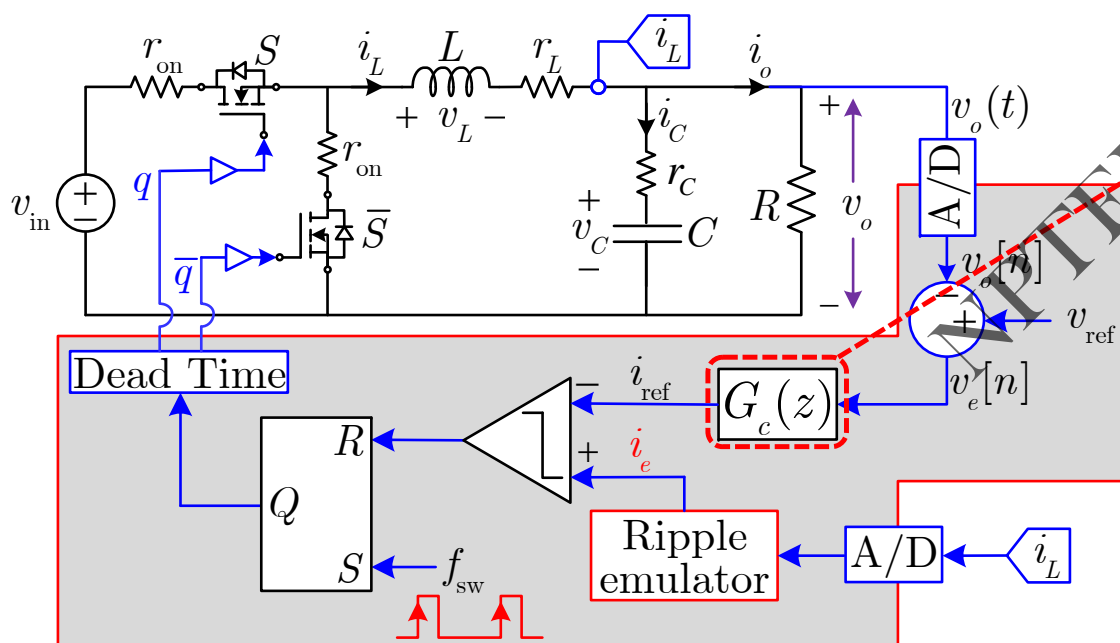


ADC (contd...)

A/D conversion



Digital Controller

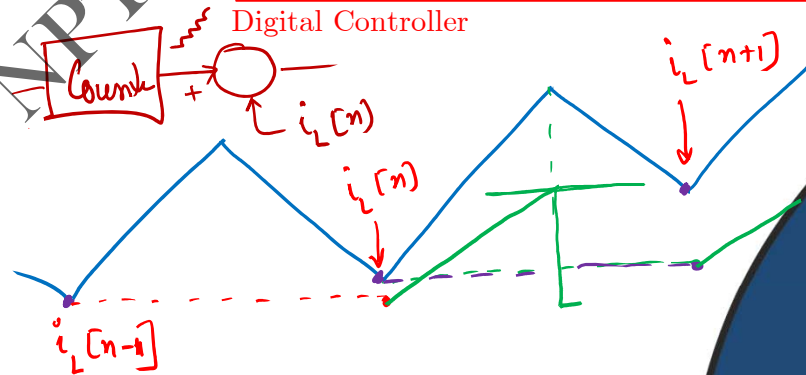
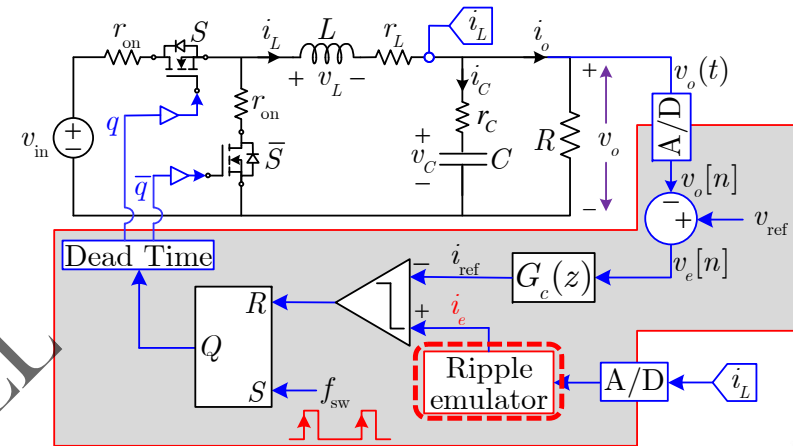
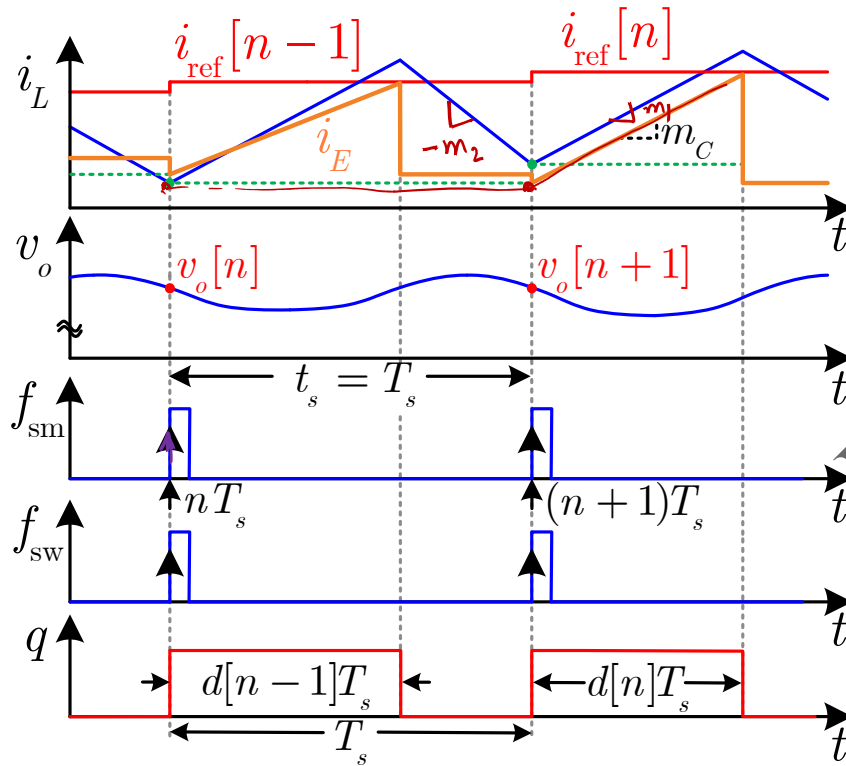


$$G_c(z) = k_p + \frac{k_I}{1 - z^{-1}}$$

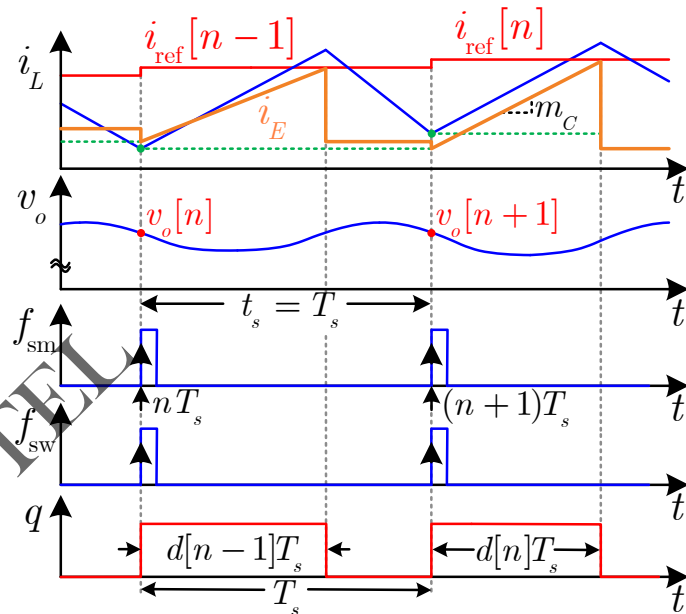
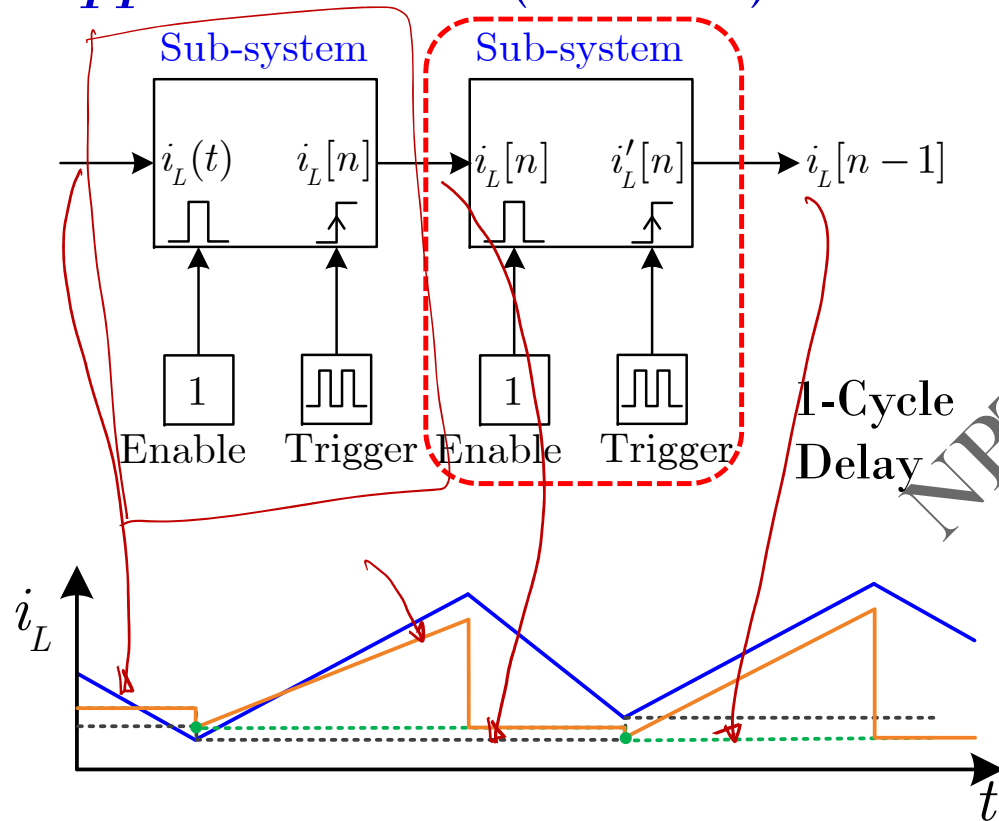
Digital Controller

Ripple Emulator

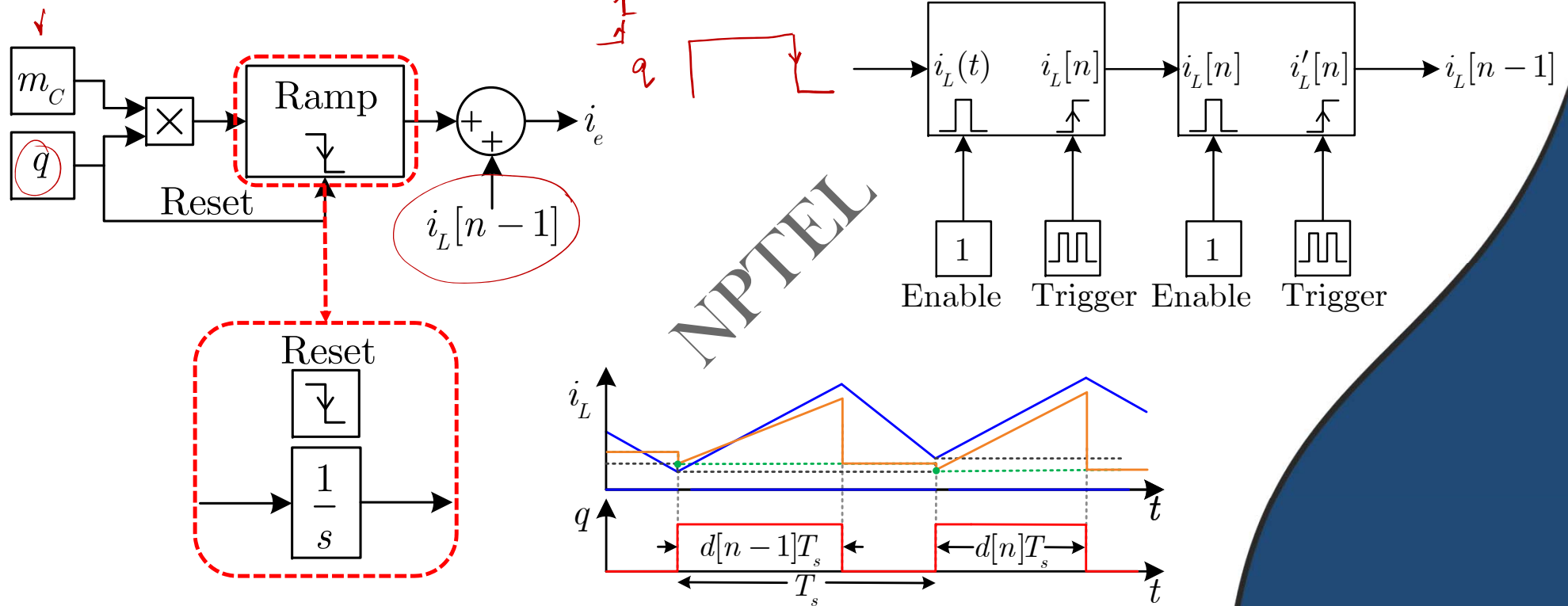
$$m_c > m_1 + m_2$$



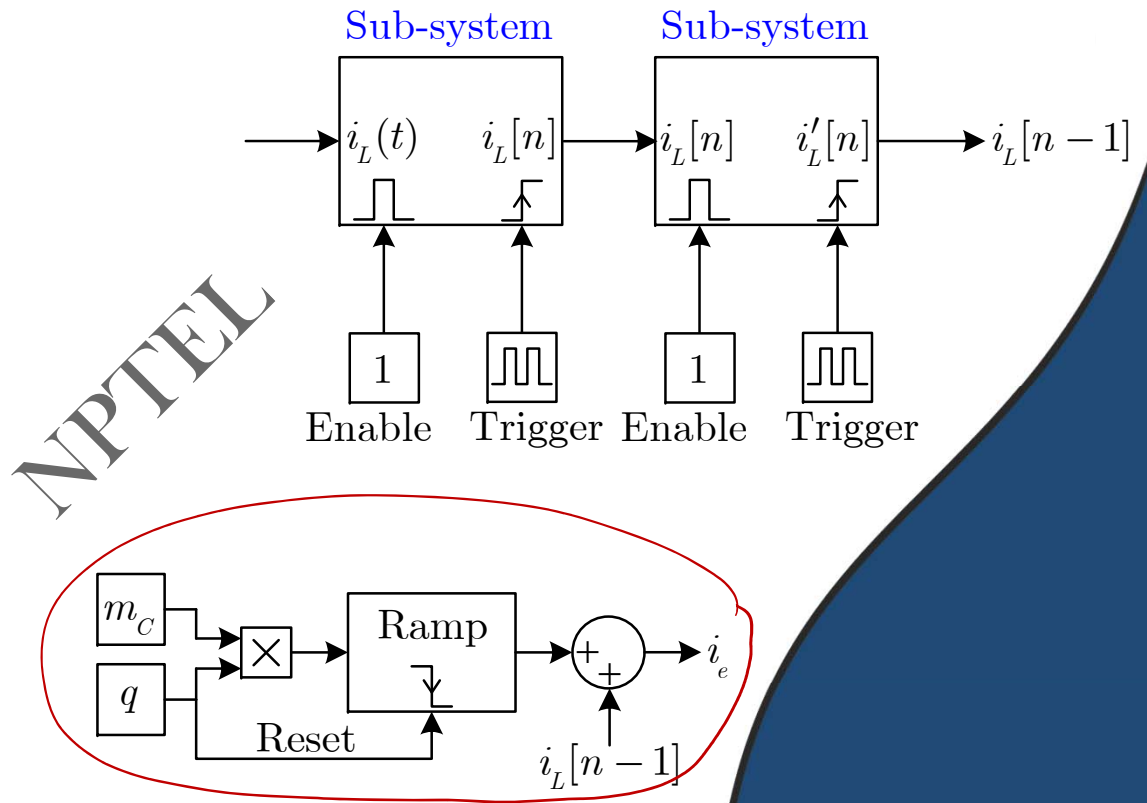
Ripple Emulator (contd...)



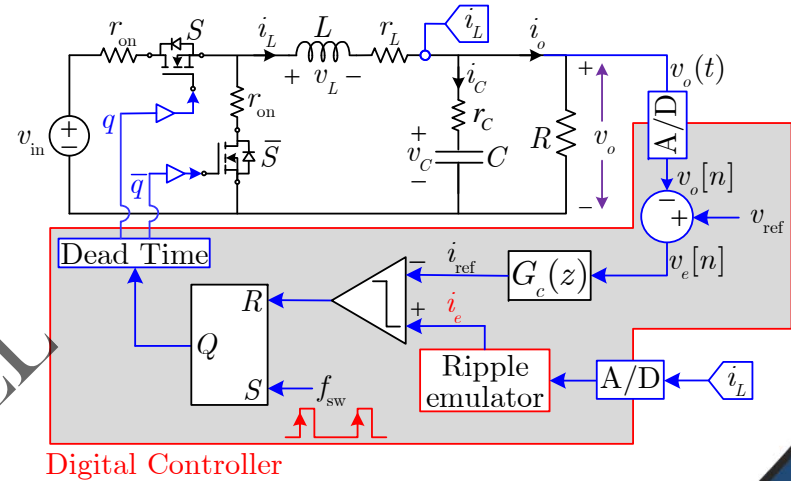
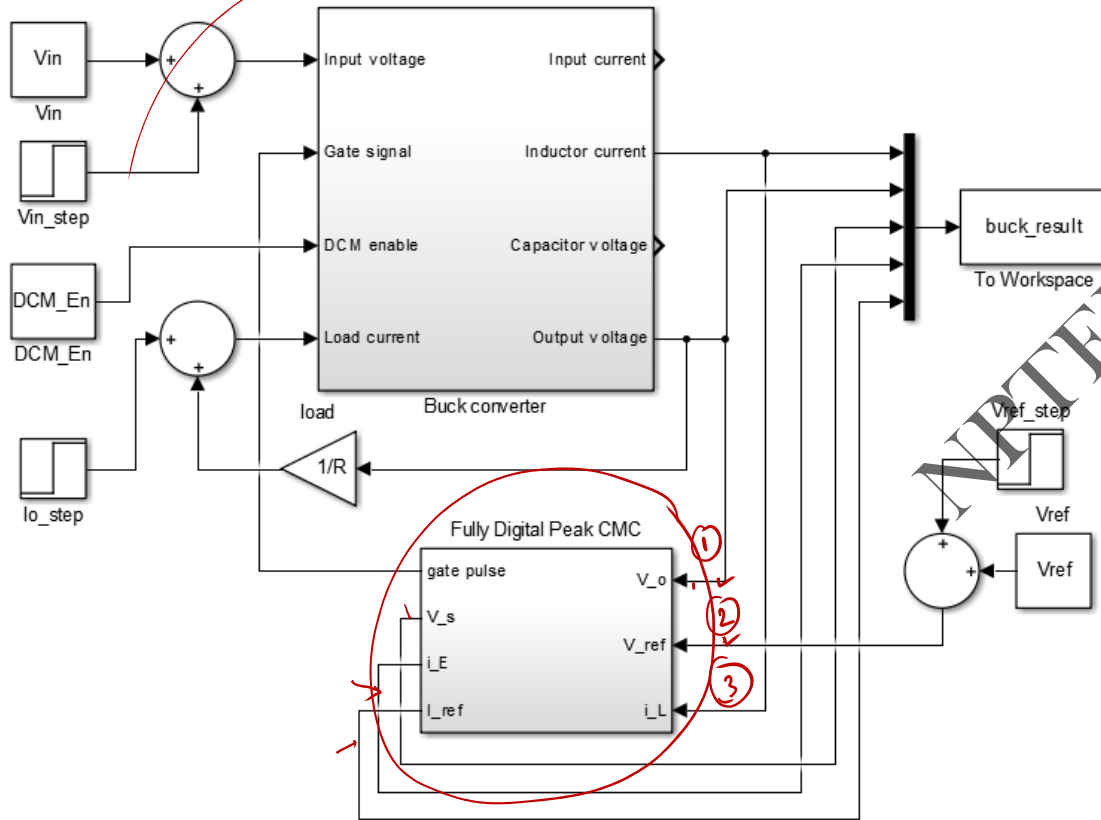
Ripple Emulator (contd...)



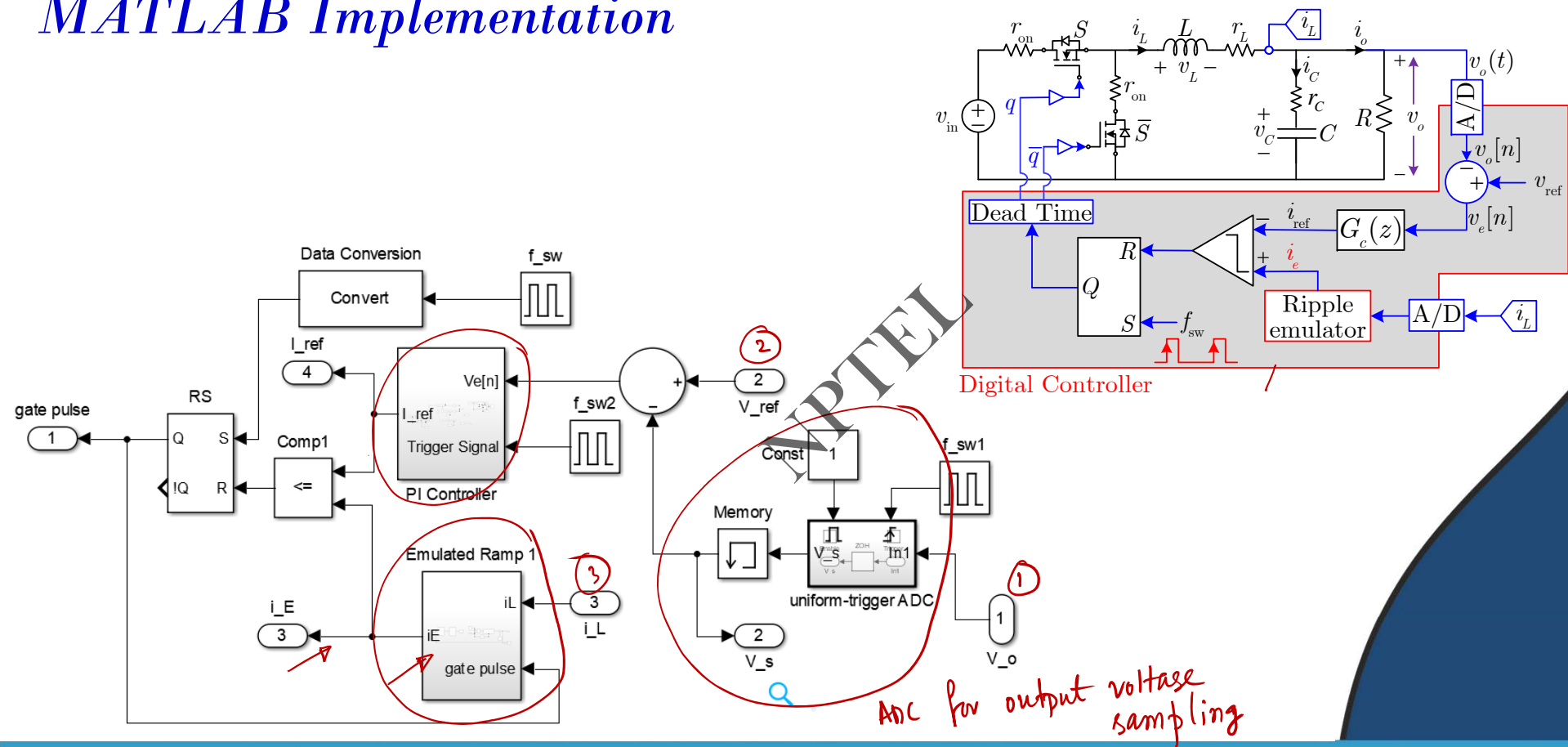
Ripple Emulator (contd...)



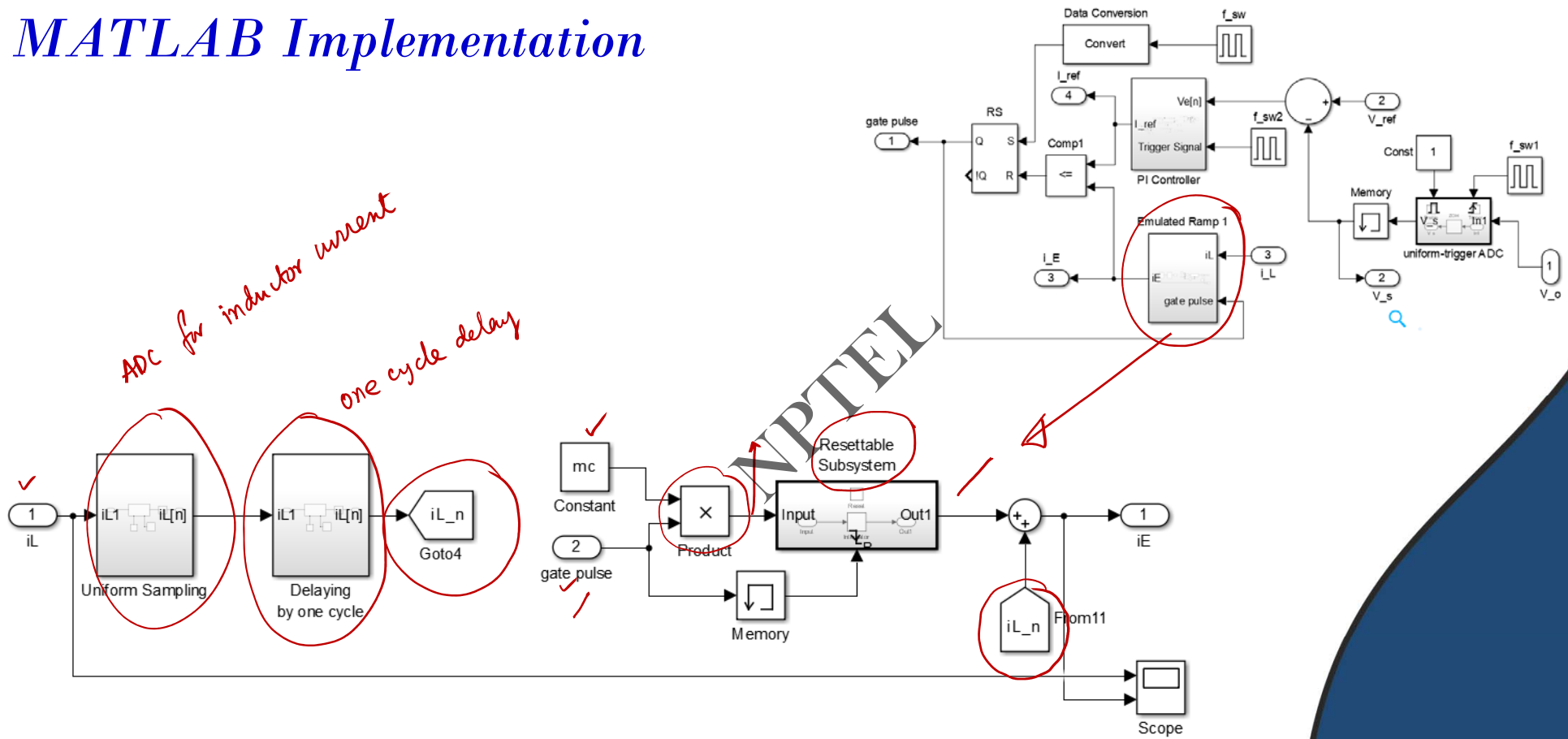
MATLAB Implementation



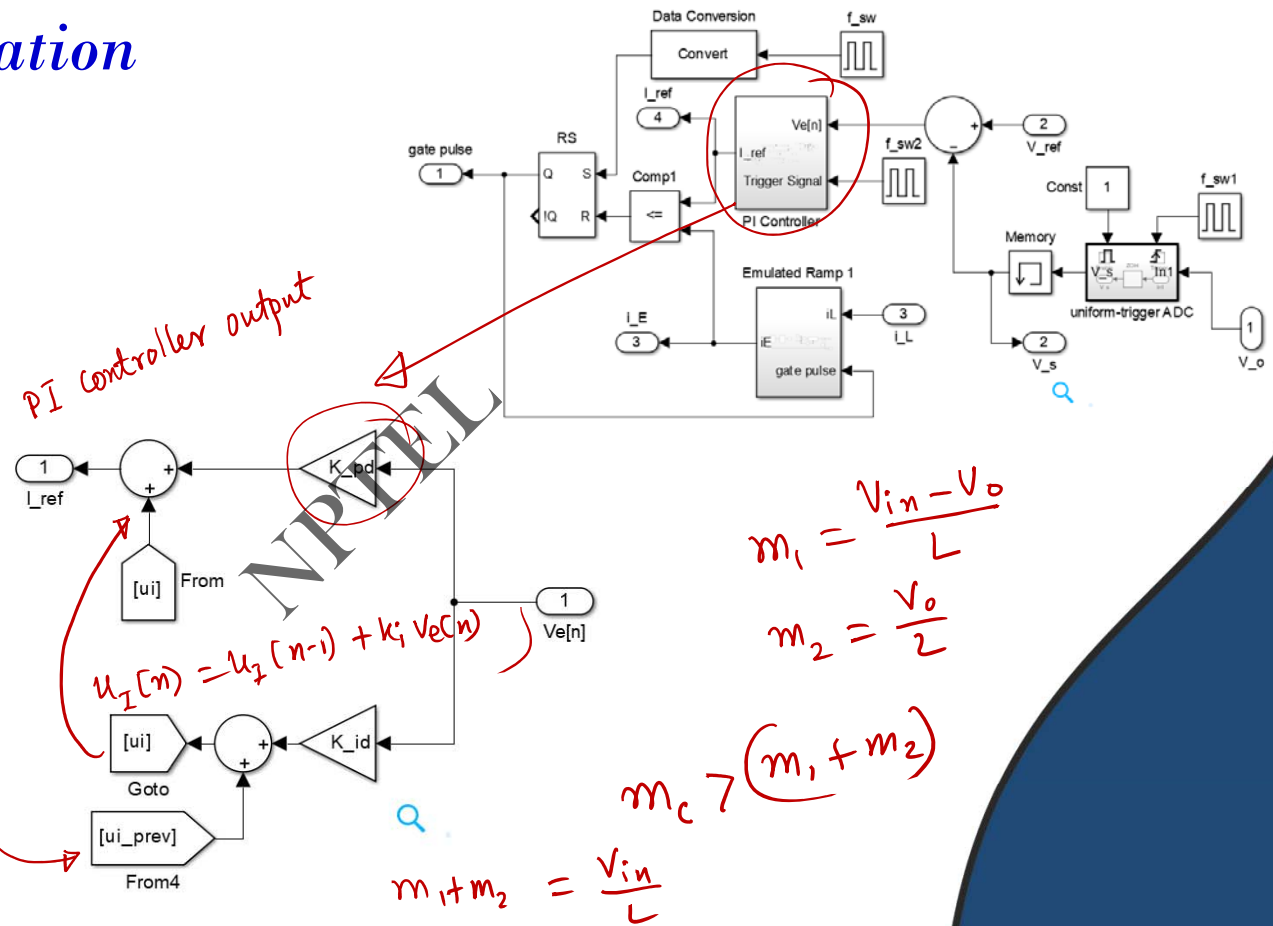
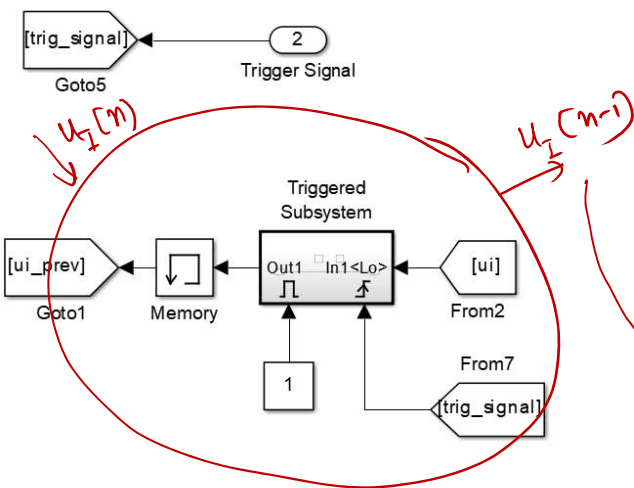
MATLAB Implementation



MATLAB Implementation

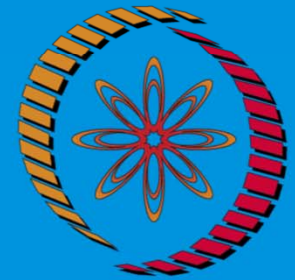


MATLAB Implementation



CONCLUSION

- Custom MATLAB model development for fully digital current mode control
- MATLAB simulation studies



**THANK
YOU !**