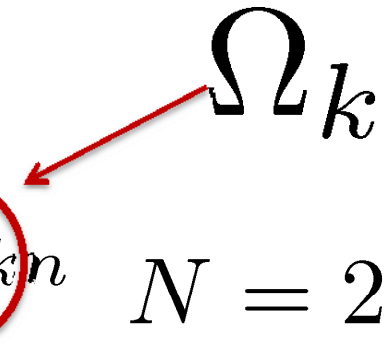


INTRODUCTION TO EECS II  
**DIGITAL  
 COMMUNICATION  
 SYSTEMS**

# 6.02 Spring 2009 Lecture #15

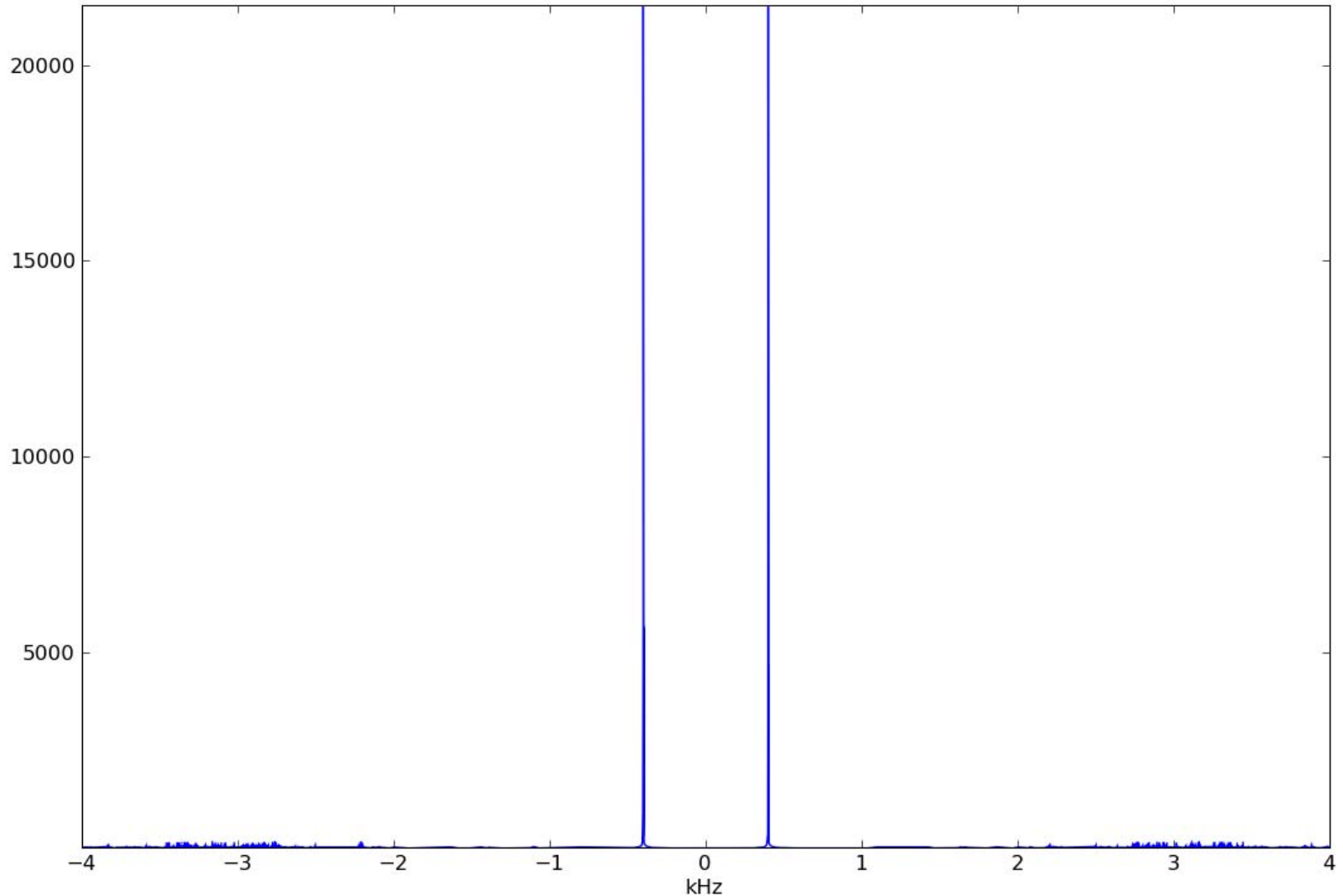
- Examples of Plotting Spectrum
- Modulation
- Using DFT pictures for Modulation

# Reminder about DFT

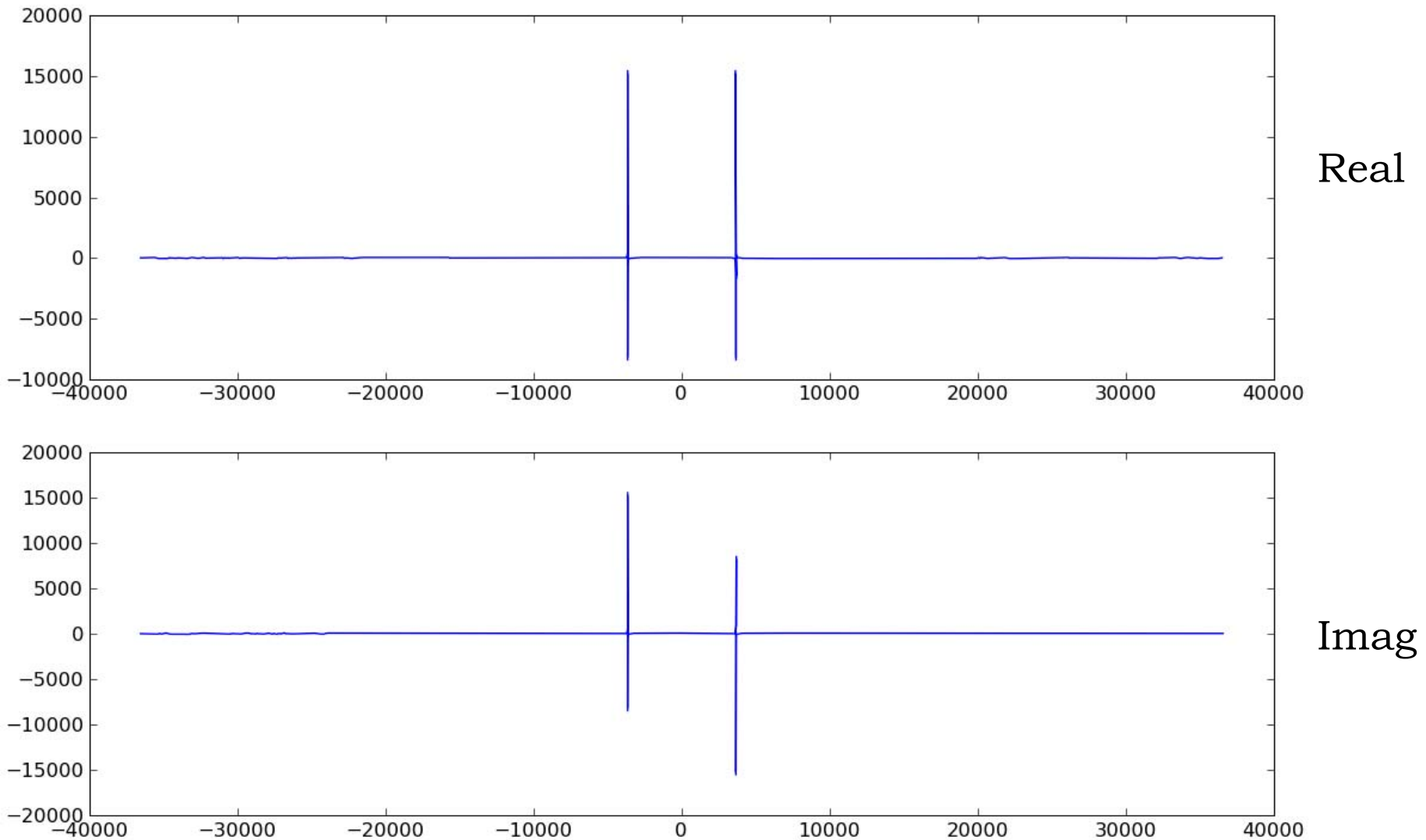
$$s[n] = \frac{1}{N} \sum_{k=-K}^K S[k] e^{j \frac{2\pi}{N} kn} \quad N = 2K + 1$$


$$S[k] = \sum_{n=0}^{N-1} s[n] e^{-j \frac{2\pi}{N} kn}$$

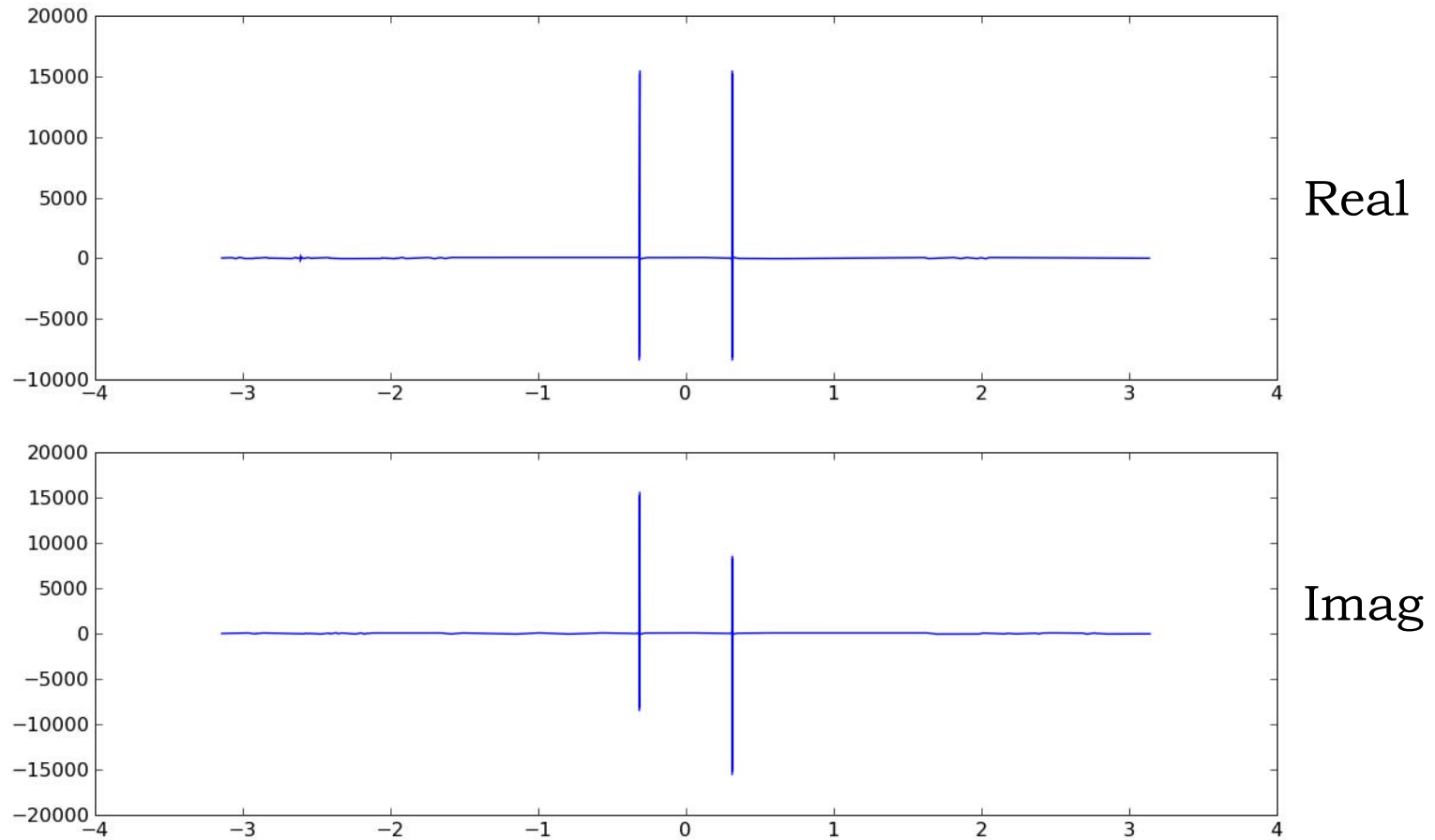
# $|S[k]|$ vs frequency (8000 samples/sec)



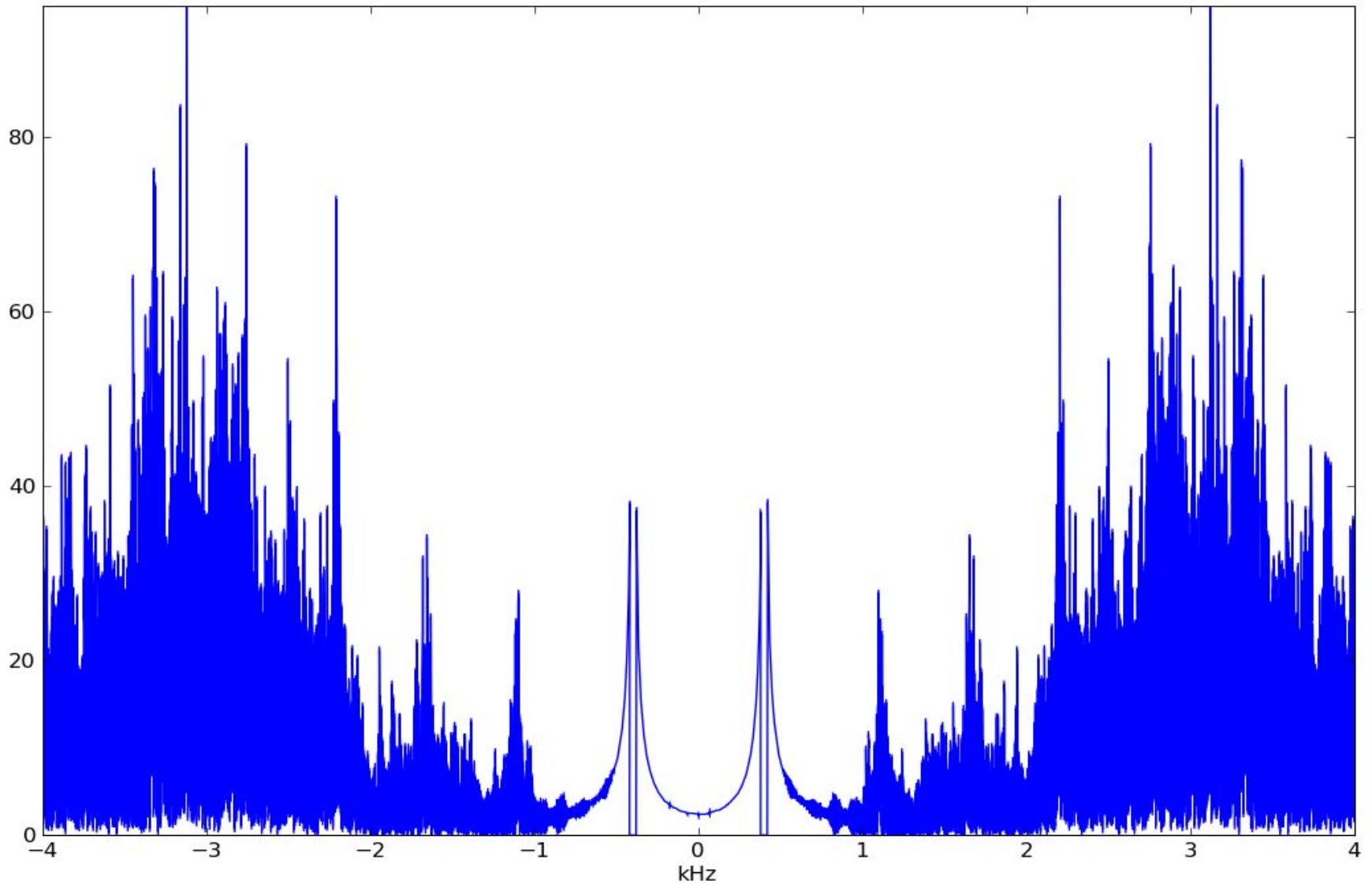
# $S[k]$ vs $k$ (73,313 Samples)



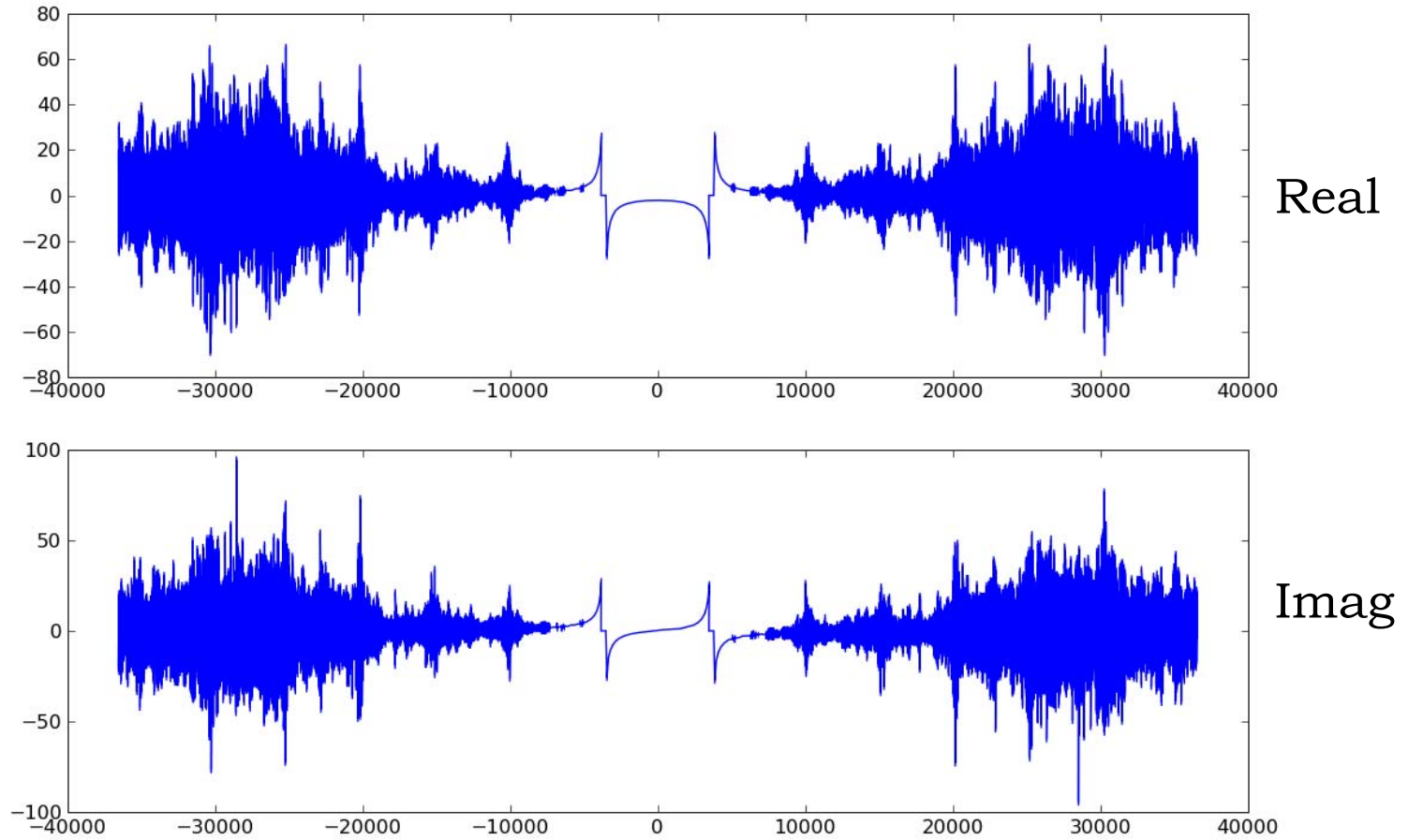
# S[k] vs Omega



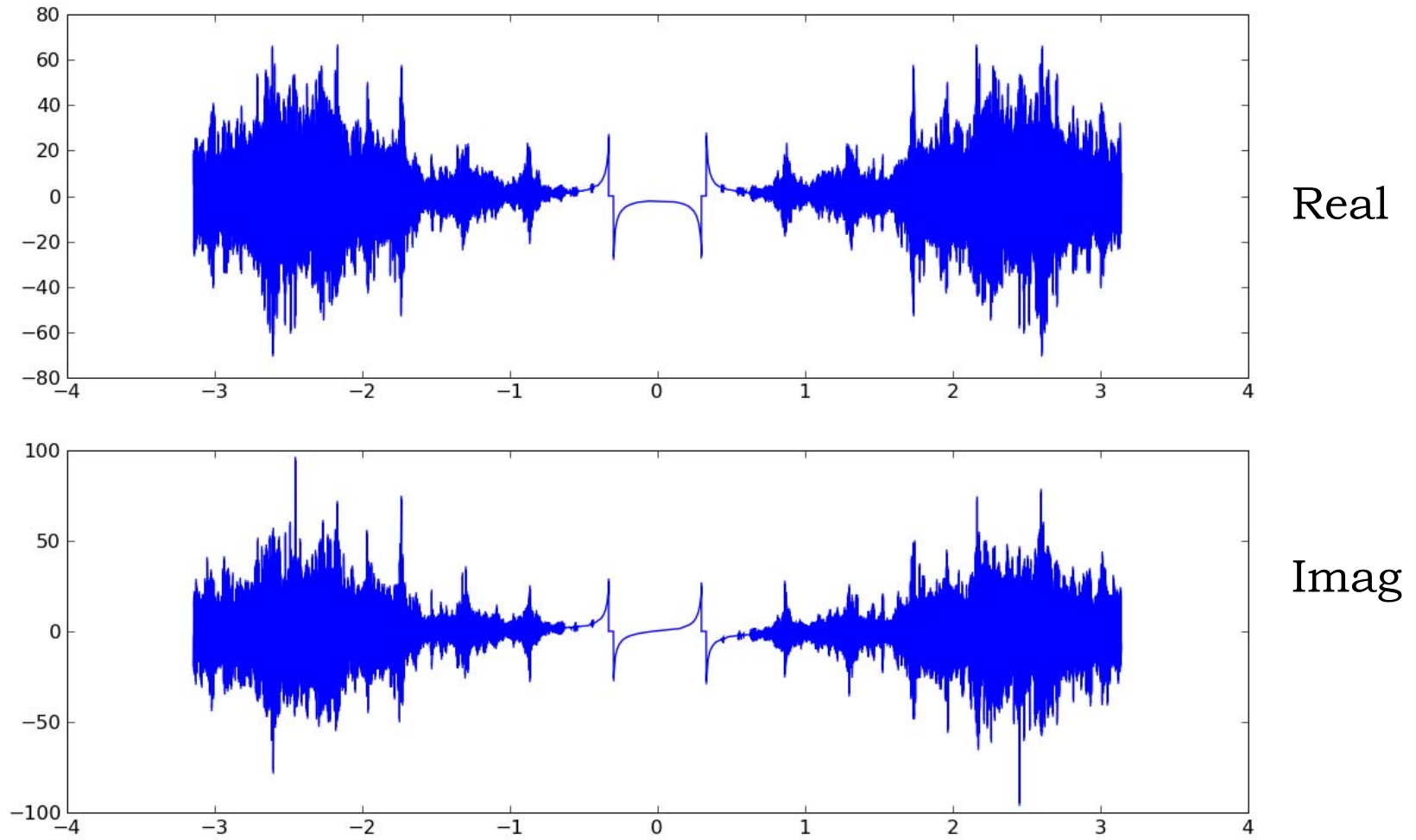
# Filtered $|S[k]|$ vs frequency (8K samp/sec)



# Filtered $S[k]$ vs $k$ (73,313 Samples)

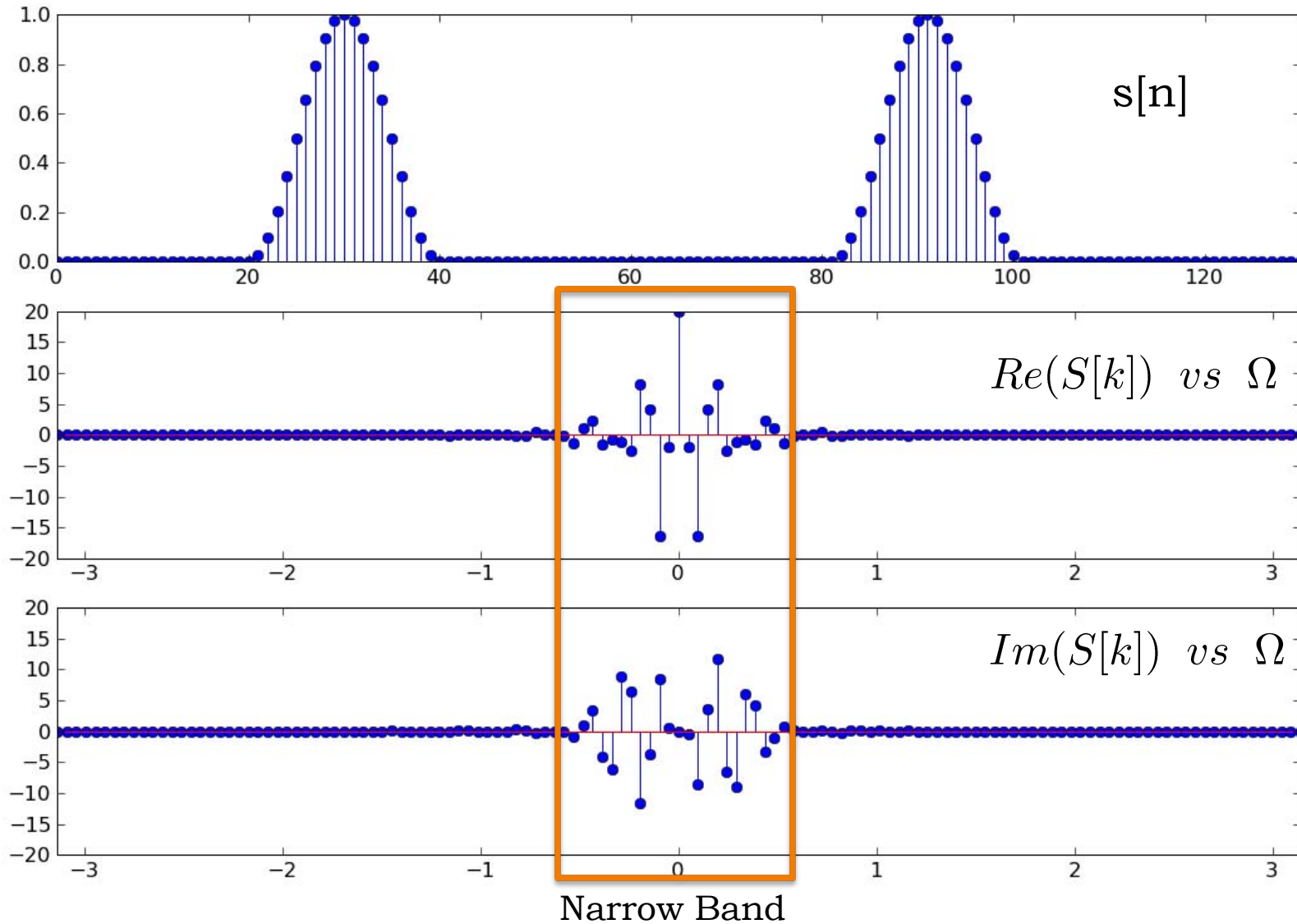


# Filtered $S[k]$ vs Omega

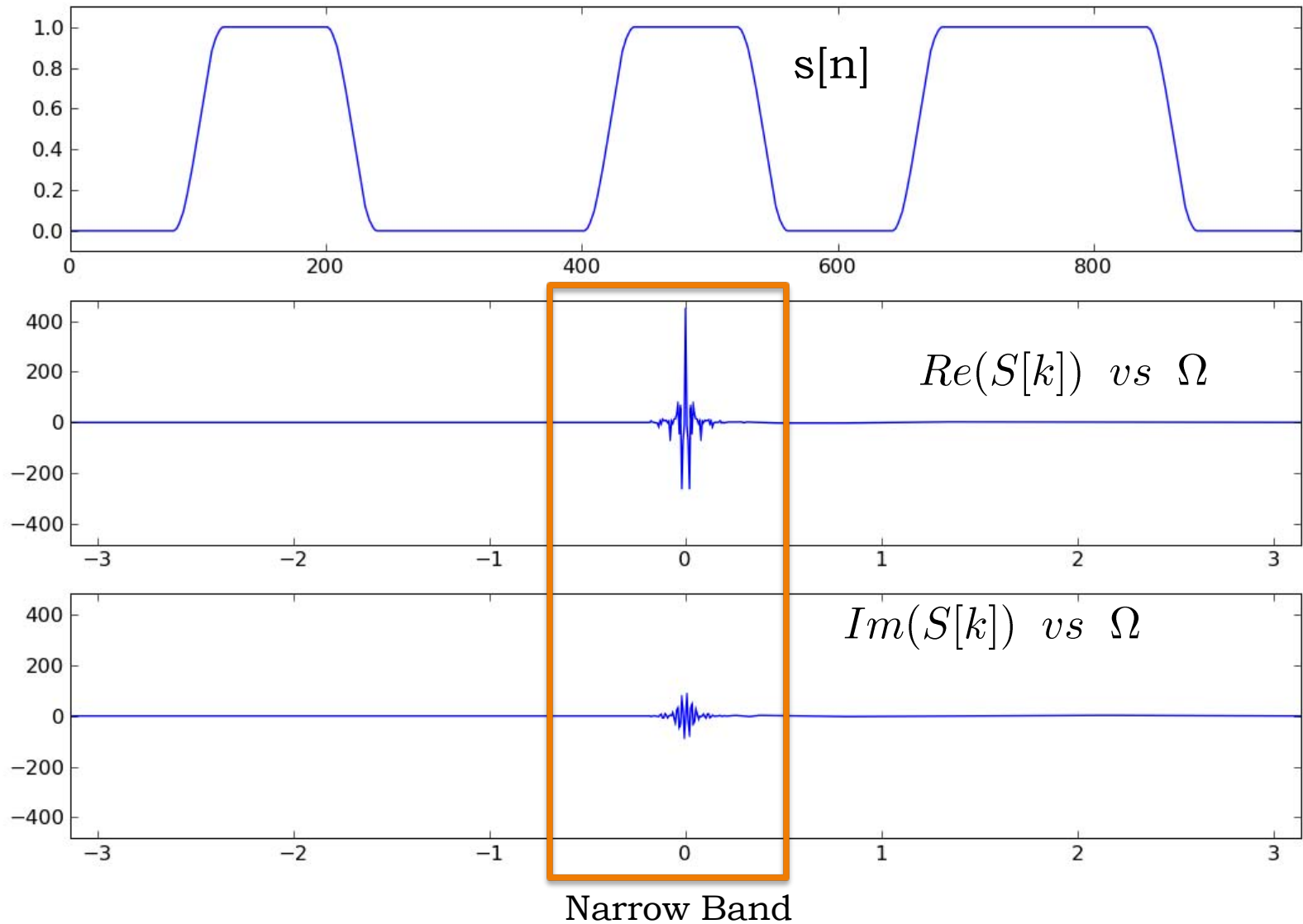




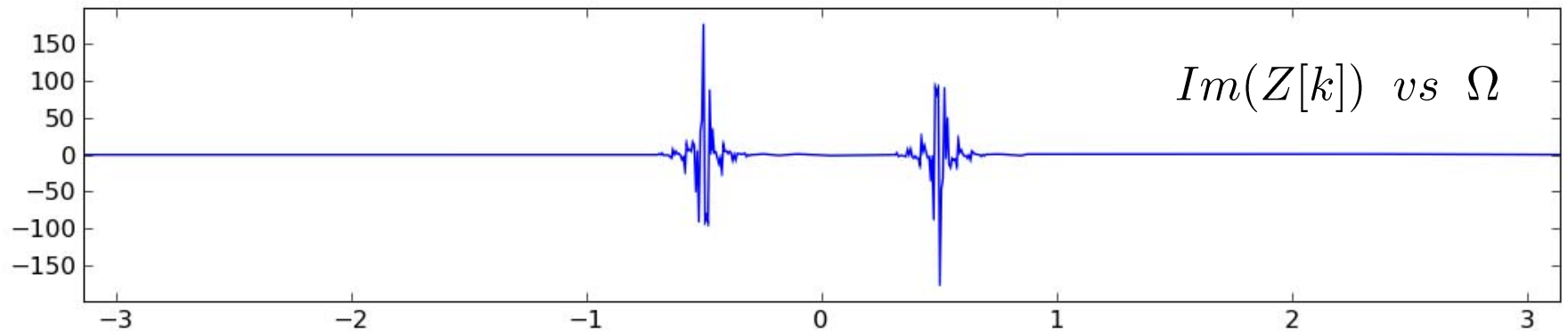
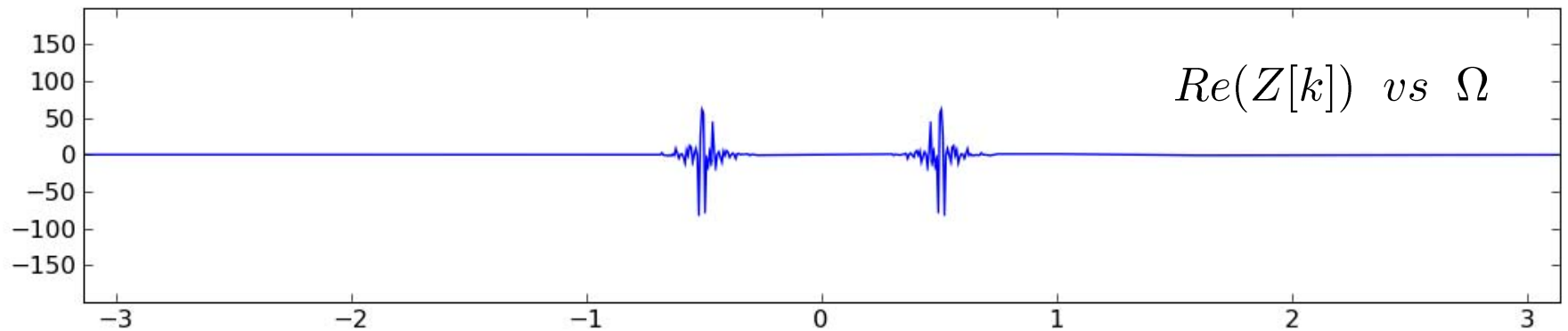
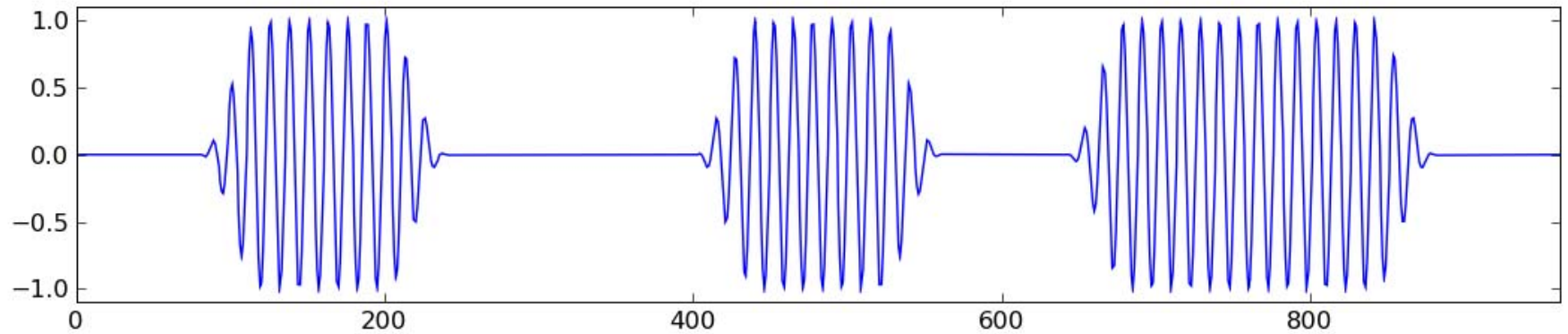
# 010010 Bit sequence with Slow Rise



# 010010110 Slow Bit sequence (No Stems)



$$z[n] = s[n] \cos 0.5n$$



$$y[n] = (s[n] \cos 0.5n) \cos 0.5n$$

