Cross-range Imaging

Continue the cross-range imaging problem in Project #2, and complete Matlab programming that generates the following results. Submit a printed report that includes 1. Figures of the results; 2. Analysis of the results (describe your observations and provide analysis of these observations); 3. Attach the Matlab code for all problems. In addition, submit the Matlab code that can be compiled to generate all the results in one .zip file to yl72@buffalo.edu.

Note: this is an individual project and please complete the project independently.

P3.1 Perform upsampling by zero-padding the compressed synthetic aperture signal in k_u domain. Plot the compressed synthetic aperture signal spectrum $|S_c(\omega, k_u)|$ after zero-padding.

P3.2 Perform inverse DFT of the upsampled signal in P3.1 and plot the real part of the compressed synthetic aperture signal $\mathrm{Re}[s_c(\omega, u)]$ after upsampling versus u.

P3.3 Perform decompression in u domain followed by baseband conversion. Plot the real part of the alias-free baseband synthetic aperture signal $\mathrm{Re}[s_b(\omega, u)]$ versus u.

P3.4 Perform DFT of the baseband alias-free synthetic aperture signal $s_b(\omega, u)$ obtained in P3.3, and plot the baseband synthetic aperture signal spectrum $|S_b(\omega, k_u)|$ versus k_u.

P3.5 Perform baseband matched-filtering and plot the cross-range reconstruction $|f(y)|$ versus y.