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EE 384 Classwork 10 Due 24 October 2021

PDF Questions:

**3:**

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| All of the scans took 15 seconds. |

**7b: MRM Plots.**

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| **Difference of 1m for PII6 Difference of 1m for PII7**    **Difference of 1m for PII8 Difference of 1m for PII9**    **Difference of 1m for PII10 Difference of 1m for PII11**    **Difference of 1m for PII12 Difference of 1m for PII13**    **Difference of 1m for PII14 Difference of 1m for PII15**    **Difference of 1m for PII6 – PII15** |

**7f: PII vs SNR**

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| **PII vs SNR. Certainly no positive trend here. Likely an issue with taking data, most likely.** |

Questions and Further Explorations:

**1.** How closely did your measurements of signal to noise ratio follow the predicted increase by 3 dB as PII increases by one? How could you improve these results?

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| My results did not match the 3db increase whatsoever. I could improve my results by redoing all of the scans, or taking more samples per scan. Either way, it is apparent something needs to change with how I am taking the scans. |

**2.** Discuss how the amount of time to take a scan varies with the increase in PII.

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| As PII increases, the scans will take longer. This is because each pulse represents a power of two, 2^7 = 128 pulses combined to produce a scan. For some reason, however, my scans took the same amount of time for each target and background. This most likely must come from the scan start and stop times. |

Matlab code:

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| % plotMrmRetLog.m  % This script prompts the user for a MRM-RET logfile, reads, parses, and  % produces a "waterfall plot" of the motion filtered scans and detection lists  % in the logfile  clear all; close all; clc    %% Query user for logfile  %dnm = '.'; fnm = 'MRM\_002.csv';  for count = 6:15  [fnmb,dnmb] = uigetfile('\*.csv');  fprintf('Reading logfile %s\n',fullfile(dnmb,fnmb));  [cfgb,reqb,scnb,det] = readMrmRetLog(fullfile(dnmb,fnmb));    [fnmt,dnmt] = uigetfile('\*.csv');  fprintf('Reading logfile %s\n',fullfile(dnmt,fnmt));  [cfgt,reqt,scnt,dett] = readMrmRetLog(fullfile(dnmt,fnmt));    %% Pull out the raw scans (if saved)  rawscansIb = find([scnb.Nfilt] == 1);  rawback = reshape([scnb(rawscansIb).scn],[],length(rawscansIb))';    rawscansIt = find([scnt.Nfilt] == 1);  rawtar = reshape([scnt(rawscansIt).scn],[],length(rawscansIt))';    if count == 6  sdiff6 = abs(rawback - rawtar);  s6 = sdiff6;  elseif count == 7  sdiff6 = abs(rawback - rawtar);  s7 = sdiff6;  elseif count == 8  sdiff6 = abs(rawback - rawtar);  s8 = sdiff6;  elseif count == 9  sdiff6 = abs(rawback - rawtar);  s9 = sdiff6;  elseif count == 10  sdiff6 = abs(rawback - rawtar);  s10 = sdiff6;  elseif count == 11  sdiff6 = abs(rawback - rawtar);  s11 = sdiff6;  elseif count == 12  sdiff6 = abs(rawback - rawtar);  s12 = sdiff6;  elseif count == 13  sdiff6 = abs(rawback - rawtar);  s13 = sdiff6;  elseif count == 14  sdiff6 = abs(rawback - rawtar);  s14 = sdiff6;  elseif count == 15  sdiff6 = abs(rawback - rawtar);  s15 = sdiff6;  end    %% Create the waterfall horizontal and vertical axes  Tbin = 32/(512\*1.024); % ns  T0 = 0; % ns  c = 0.29979; % m/ns  Rbin = c\*(Tbin\*(0:size(sdiff6(1,:),2)-1) - T0)/2;% Range Bins in meters    % Difference plot  % plot(Rbin,sdiff6(10,:))  [a6,i]=max(sdiff6(10,:));  if count == 6  sample = sdiff6(10,23:67);  var = var(sample);  SNR6 = 10\*log10(a6^2/var);  elseif count == 7  sample = sdiff6(10,23:67);  var = var(sample);  SNR7 = 10\*log10(a6^2/var);  elseif count == 8  sample = sdiff6(10,23:67);  var = var(sample);  SNR8 = 10\*log10(a6^2/var);  elseif count == 9  sample = sdiff6(10,23:67);  var = var(sample);  SNR9 = 10\*log10(a6^2/var);  elseif count == 10  sample = sdiff6(10,23:67);  var = var(sample);  SNR10 = 10\*log10(a6^2/var);  elseif count == 11  sample = sdiff6(10,23:67);  var = var(sample);  SNR11 = 10\*log10(a6^2/var);  elseif count == 12  sample = sdiff6(10,23:67);  var = var(sample);  SNR12 = 10\*log10(a6^2/var);  elseif count == 13  sample = sdiff6(10,23:67);  var = var(sample);  SNR13 = 10\*log10(a6^2/var);  elseif count == 14  sample = sdiff6(10,23:67);  var = var(sample);  SNR14 = 10\*log10(a6^2/var);  elseif count == 15  sample = sdiff6(10,23:67);  var = var(sample);  SNR15 = 10\*log10(a6^2/var);  end  end  figure(1);  hold on;  xlabel("Distance (m)");  ylabel("Amplitude");  plot(Rbin, s6), plot(Rbin, s7), plot(Rbin, s8), plot(Rbin, s9), plot(Rbin, s10)  plot(Rbin, s11), plot(Rbin, s12), plot(Rbin, s13), plot(Rbin, s14), plot(Rbin, s15)  legend('PII6', 'PII7', 'PII8', 'PII9', 'PII10', 'PII11', 'PII12', 'PII13', 'PII14', 'PII15');  hold off;  PII = (6:15);  SNR = [SNR6 SNR7 SNR8 SNR9 SNR10 SNR11 SNR12 SNR13 SNR14 SNR15];  figure(2);  plot(PII, SNR);  xlabel('PII 6-15');  ylabel('SNR'); |