Appendix C – Example of a Matlab® Script to Calculate and Display the Components of the Flicker Perception Metric

This appendix is published in the following document:

Alliance for Solid-State Illumination Systems and Technologies (ASSIST). 2015. *ASSIST recommends… Recommended metric for assessing the direct perception of light source flicker.* Vol. 11, Iss. 3. Troy, N.Y.: Lighting Research Center. Internet: http://www.lrc.rpi.edu/programs/solidstate/assist/recommends/flicker.asp.

```
% Script for calling LRCFlickerMetric(waveform,Srate)

% Ask for location of LIGHT waveform file and upload it
disp('Loading data...')
message = 'Select file with light waveform information';
[filename1,pathname1] = uigetfile('*.txt',message);
fid = fopen([pathname1 filename1],'r');
C = textscan(fid,'%f%f','Delimiter','\t'); % C is a cell structure
fclose(fid);
Time = C{1}; % the first element of C is the array of time values
waveform = C{2}; % the second element of C is the array of waveform values
disp('Loading data complete...')

% Calculate LRC Flicker Metric
Srate = 1/(Time(2)-Time(1));
[Mp,f,Mpk,M] = LRCFlickerMetric(waveform,Srate);
disp(['LRC Flicker Metric: ' num2str(Mp,'%.2f')]); % Display Flicker Metric
% Calculate probability of flicker perception and display
PP = 100/(1 + exp(-5.4*(Mp - 1.04)));
disp(['Probability of flicker perception = ' num2str(PP,'%.0f') '%'])

% Calculate Flicker Percent
flickerPercent = (max(waveform) - min(waveform))/(max(waveform) + ...
                 min(waveform))*100;
disp(['Flicker Percent: ' num2str(flickerPercent,'%.2f')]);

% Calculate Flicker Index
flickerIndex = sum(waveform(waveform > mean(waveform)) - ...
               mean(waveform))/sum(waveform);
disp(['Flicker Index: ' num2str(flickerIndex,'%.2f')]);

% Create figure window
%scrsz = get(0,'ScreenSize');
figure(1)
set(gcf,'Position',[200,50,1000,860]);
% Plot waveform
subplot(3,1,1)
plot(Time,waveform,'b-','LineWidth',2);
axis([Time(1) Time(end) min(waveform)*.95 max(waveform)*1.05]);
title('Light Waveform','FontSize',14);
xlabel('Time (s)','FontSize',14);
ylabel('Signal (V)','FontSize',14);
set(gca,'FontSize',14);

%Plot unweighted modulation components
subplot(3,1,2);
%plot(f,M*100,'b-','LineWidth',2);
bar(f,M*100);
set(gca,'FontSize',14);
hLegend = legend('Unweighted components','Location','NorthEast');
set(hLegend,'FontSize',12);
set(gca,'XLim',[5,130]);
%title('Flicker Percent Spectrum','FontSize',14)
xlabel('Frequency (Hz)','FontSize',14);
ylabel('Spectral Flicker Percent','FontSize',14);
```

```
%Plot weighted frequency content
subplot(3,1,3)
%plot(f,Mpk,'r','LineWidth',2)
bar(f,Mpk,'r');
hold on
plot([0,max(f)],[1,1],'k','LineWidth',2) % Plot threshold line x = 1
hold off
set(gca,'FontSize',14)
hLegend = legend('Weighted Percent Flicker Spectrum',...
          'Flicker Threshold','Location','NorthEast');
set(hLegend,'FontSize',12);
set(gca,'XLim',[5,130]);
set(gca,'YLim',[0,2]);
xlabel('Frequency (Hz)','FontSize',14)
ylabel('Spectral Perceptual Flicker','FontSize',14)
% Add text information to graph
hold off
figure(1)
xpos = 82;
H1 = text(xpos,0.7,['Flicker percent = ' num2str(flickerPercent,'%.1f')...
     ' %']);
H2 = text(xpos,0.5,['Flicker index = ' num2str(flickerIndex,'%.1f') ' %']);
H3 = text(xpos,1.3,['LRC Flicker Metric = ' num2str(Mp,'%.1f')]);
H4 = text(xpos,1.1,['Detection probability =   ' num2str(PP,'%.0f'),' %']);
set(H1,'FontSize',14,'FontWeight','bold');
set(H2,'FontSize',14,'FontWeight','bold');
set(H3,'FontSize',16,'FontWeight','bold');
set(H4,'FontSize',14,'FontWeight','normal');
% End of program ------------------------------------------------------------
```