ML_14_3 Nyquist plots

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% Onwubolu, G. C.
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%
% Chapter 14: Nyquist plots
%
% Example 14.7: We can use MATLAB to make Nyquist diagrams using
% nyquist(G), where G(s) = numg/deng and G is an LTI transfer-function
object.
% Information about the plots obtained with nyquist(G) can be found by
% left-clicking the mouse on the curve. The user can find the curve's label, as
well
% as the coordinates of the point on which you clicked and the frequency.
Right
% clicking away from a curve brings up a menu if the icons on the menu bar
are
% deselected. From this menu you can select (1) system responses to be
% displayed and (2) characteristics, such as peak response.
% When selected, a dot appears on the curve at the appropriate point. Let
% your mouse rest on the point to read the value of the characteristic. The
user
% also may  select (3) whether or not to show negative frequencies, (4)
choices
% for grid on or off, and (5) choice for zooming to (-1,0), (6) returning to
% full view after zooming, and (7) properties, such as labels, limits, units,
% style, and characteristics. We can obtain points on the plot by using
% [re,im,w] = nyquist(G), where the real part, imaginary part, and frequency
% are stored in re, im, and w, respectively, and re and im are 3-D
% arrays. We can specify a range of w by using [re,im] = nyquist(G,w).
% We use re(:,:)'consider look at Example 14.7 in the text. By the way, the
% code is simply adapted for other problems by changing the function, G(s).

'Example 14.7'                  % Display label.
clf                             % Clear graph on screen.
%numg=[1 2];                    % Define numerator of G(s).
%deng=[1 0 0];                  % Define denominator of G(s).
numg=750;                       % Define numerator of G(s).
deng=conv([1 6 8],[1 8]);       % Define denominator of G(s).
'G(s)'                          % Display label.
G=tf(numg,deng)                 % Create and display G(s).
nyquist(G)                      % Make a Nyquist diagram.
grid on                         % Turn on grid for Nyquist diagram.
title('Open-Loop Frequency Response')
                                % Add a title to the Nyquist diagram.
w=0:0.5:10;                     % Let 0<w<10 in steps of 0.5.
```

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[re,im]=nyquist(G,w);              % Get Nyquist diagram points for a range
                                   % of w.
points=[re(:,:)',im(:,:)',w']      % List specified range of points in
                                   % Nyquist diagram.
```