Contents


```
%Tyler Matthews
%System Simluation Midterm P2
clc; close all;
```

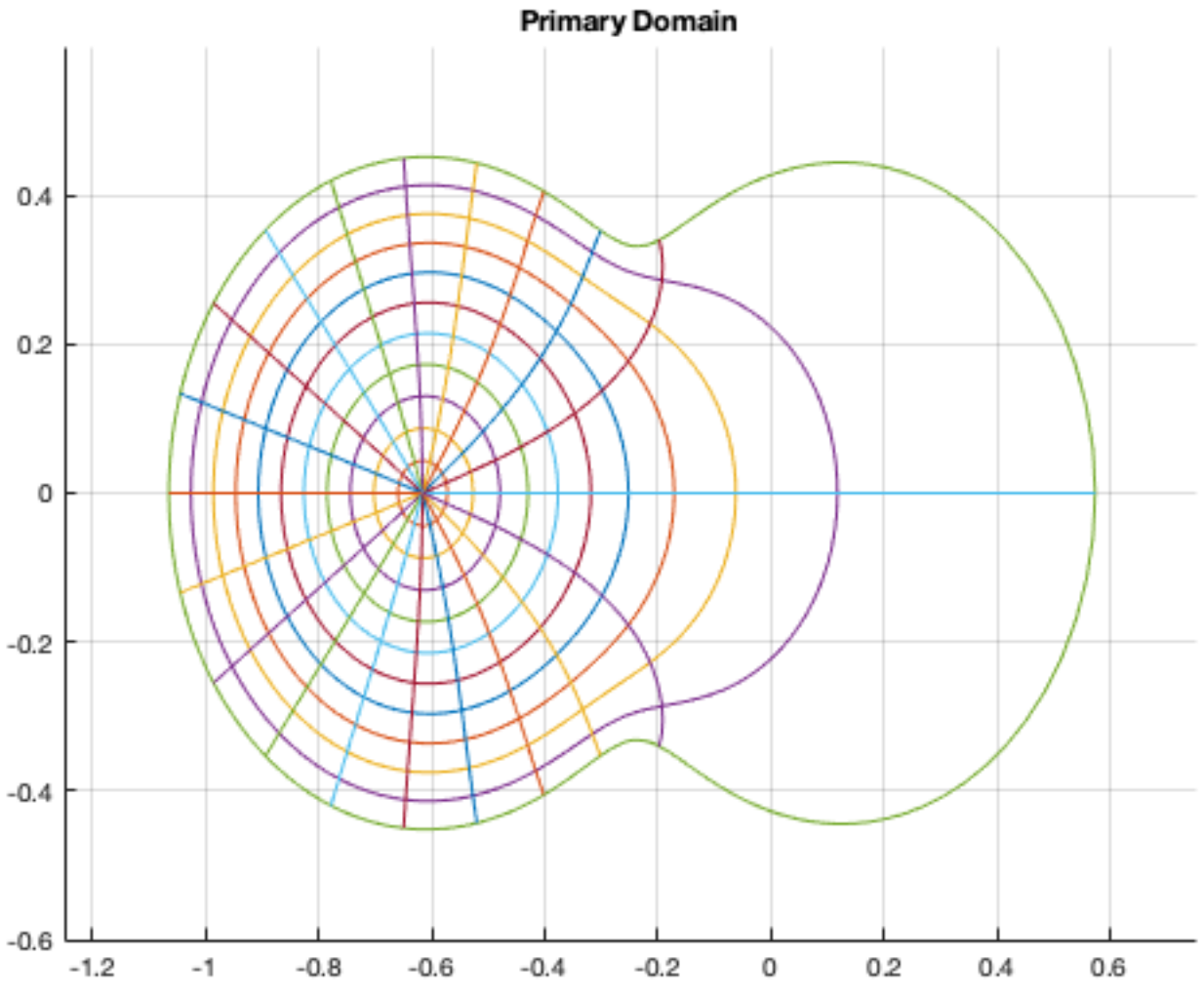
PARTC

```
num = [0 1.27 -0.73];
den = [1 -1.45 0.45];


Hp = tf(num, den)
zeros = roots(num)
poles = roots(den)

Phi = tf(den, num) %(sigma / roe) : (row - l*sigma)
newNum = [12700 -14600 4870] %Numerator of derivative of Phi

badPoints = roots(newNum)
magnitude = abs(badPoints)

Nt=21;
Nr=12;

theta=linspace(0,2*pi,1001);
rho=linspace(0,0.5256,1001);
tvec=linspace(0,2*pi,Nt);
rvec=linspace(0,0.5256,Nr);

temp = (roots(den - num*0.5748));
mag = abs(temp)
ang = angle(temp)

for k=1:length(rvec)
 z=rvec(k)*exp(i*theta);
 w=(z.^2-z.*1.45 + 0.45)./(z.*1.27-0.73);

 hold on
 plot(real(w), imag(w))
 hold off
end

for k=1:length(tvec)-1
 z=rho*exp(i*tvec(k));
 w=(z.^2-z.*1.45 + 0.45)./(z.*1.27-0.73);
 hold on
 plot(real(w), imag(w))
 hold off
```

```
end

grid on
axis([-1.25 0.75 -0.6 0.6])
title('Primary Domain')
% TESTING TO FIND INTERSECTION POINT -> Intersection at 0.5748

% z77 = 0.7742*exp(i*theta);
% w77=(z77.^2-z77.*1.45 + 0.45)./(z77.*1.27-0.73);
% figure(1)
% clf
% plot(real(w77),imag(w77))
%
% z49 = 0.4936*exp(i*theta);
% w49=(z49.^2-z49.*1.45 + 0.45)./(z49.*1.27-0.73);
%
% figure(2)
% clf
% plot(real(w49),imag(w49))


% for N=1:10
%     temp =  0.5748 + N*0.00001
%     val = sprintf('N = %0.5f',temp);
%     z = (temp) * exp(i*theta);
%     w = (z.^2-z.*1.45 + 0.45)./(z.*1.27-0.73);
%     plot(real(w), imag(w));
%     title(val);
%     disp(val);
%     disp(w(1));
%     disp(w(2));
%     pause;
% end
```

```
Hp =

     1.27 s - 0.73
  -------------------
  s^2 - 1.45 s + 0.45

Continuous-time transfer function.


zeros =

    0.5748


poles =

    1.0000
    0.4500


Phi =
```

```
  s^2 - 1.45 s + 0.45
  -------------------
     1.27 s - 0.73

Continuous-time transfer function.


newNum =

       12700      -14600        4870


badPoints =

   0.5748 + 0.2304i
   0.5748 - 0.2304i


magnitude =

    0.6192
    0.6192


mag =

    1.6543
    0.5256


ang =

         0
         0
```



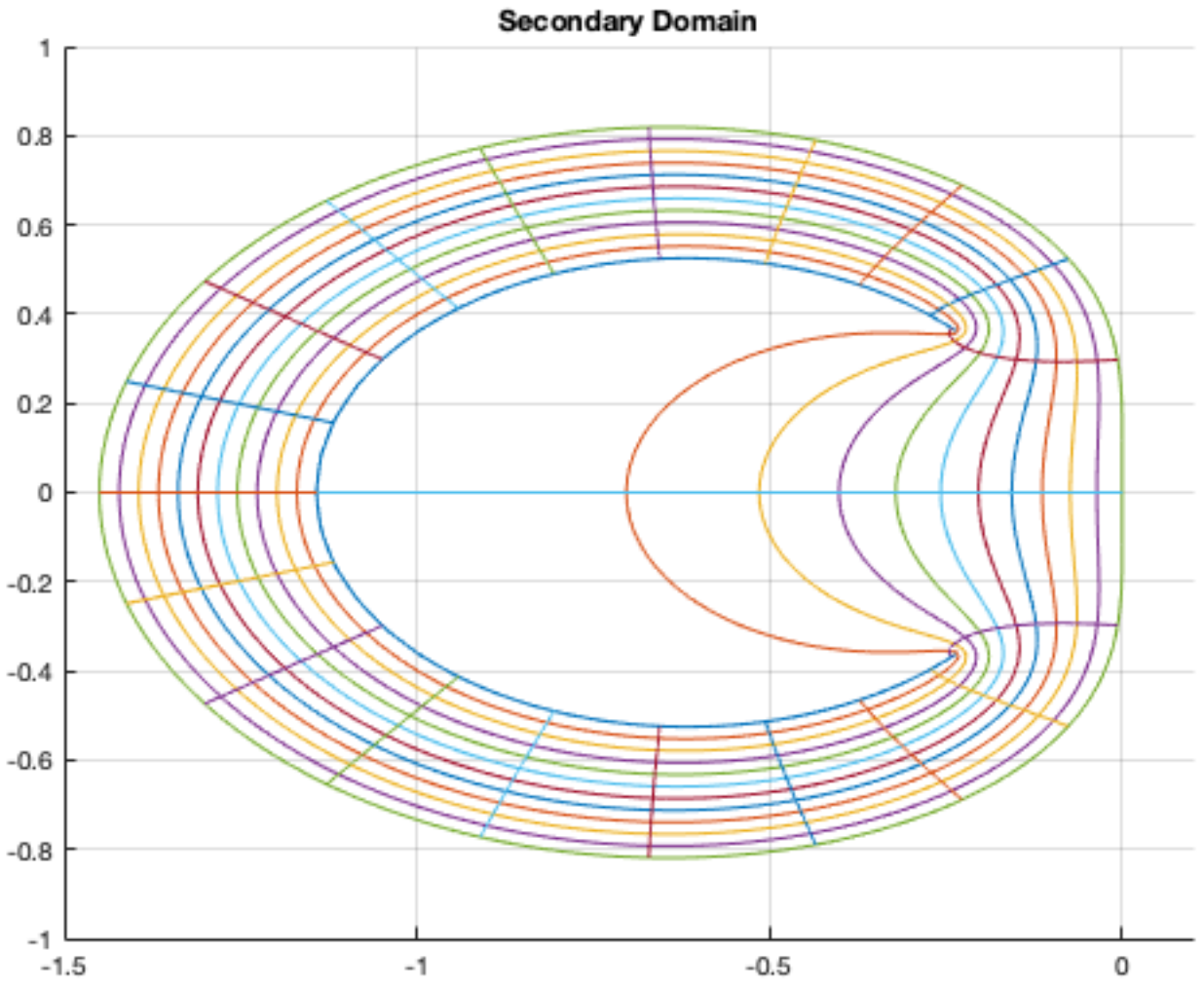
PART D

```
figure;

Nt=21;
Nr=12;

theta=linspace(0,2*pi,1001);
rho=linspace(0.6192,1,1001);
tvec=linspace(0,2*pi,Nt);
rvec=linspace(0.6192,1,Nr);

temp = (roots(den - num*0.6192));
mag = abs(temp)
ang = angle(temp)

for k=1:length(rvec)
 z=rvec(k)*exp(i*theta);
 w=(z.^2-z.*1.45 + 0.45)./(z.*1.27-0.73);

 hold on
 plot(real(w), imag(w))
 hold off
end

for k=1:length(tvec)-1
 z=rho*exp(i*tvec(k));
 w=(z.^2-z.*1.45 + 0.45)./(z.*1.27-0.73);
 hold on
```

```
 plot(real(w), imag(w))
 hold off
end

grid on
axis([-1.5 0.1 -1 1])
title('Secondary Domain')

% TESTING TO FIND INTERSECTION POINT -> Intersection at 0.6192

% for N=1:10
%     temp =  0.619 + N*0.0001
%     val = sprintf('N = %0.5f',temp);
%     z = (temp) * exp(i*theta);
%     w = (z.^2-z.*1.45 + 0.45)./(z.*1.27-0.73);
%     plot(real(w), imag(w));
%     title(val);
%     disp(val);
%     disp(w(1));
%     disp(w(2));
%     pause;
% end
```

```
mag =

    1.7084
    0.5280
```

```
ang =

     0
     0
```



PART E -- Stability Region

```
disp('Stable and Accurate Region is inside of the green outlining edge, to the right of primar
y region plot''s origin (-0.61, 0)')
disp('Stable and Inaccurate Region is inside of the green outlining edge, to the left of prima
ry region plot''s origin (-0.61, 0)')
disp('Unstable and Inaccurate Region is outside of the green outlining edge on the primary reg
ion plot')
```

```
Stable and Accurate Region is inside of the green outlining edge, to the right of primary regi
on plot's origin (-0.61, 0)
Stable and Inaccurate Region is inside of the green outlining edge, to the left of primary reg
ion plot's origin (-0.61, 0)
Unstable and Inaccurate Region is outside of the green outlining edge on the primary region pl
ot
```

Published with MATLAB® R2018a