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```
%m-file examining the impact of phase offset on monopulse processing
```

```
clear all
```

```
%cd('H:\OC Work\FY12 mmW\MATLAB')
```

```
cd('V:\PCCommon\LAMBDA Simulator\MATLAB')
```

```
k = 2*log(2);
```

```
theta_s = 0.5;
```

```
theta = linspace(-pi/2,pi/2,100);
```

```
%Sigma = @(theta) exp(-k.*theta.^2);
```

```
%Delta = @(theta) exp(-k.*(theta-theta_s).^2)-exp(-k.*(theta+theta_s).^2);
```

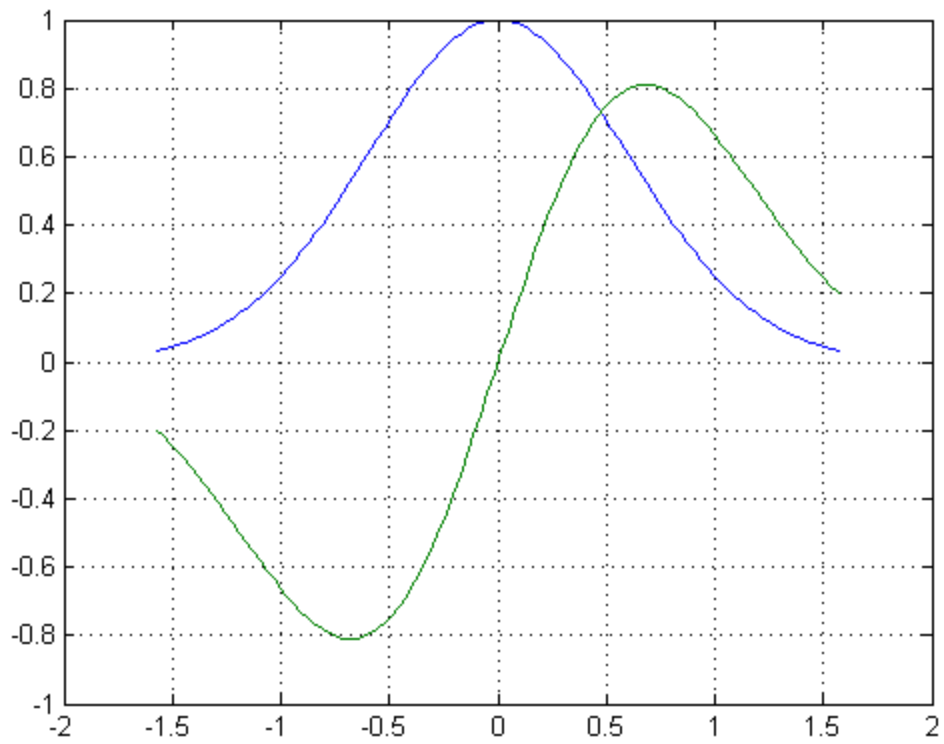
```
Sigma = exp(-k.*theta.^2);
```

```
Delta = exp(-k.*(theta-theta_s).^2)-exp(-k.*(theta+theta_s).^2);
```

```
plot(theta,Sigma,...
```

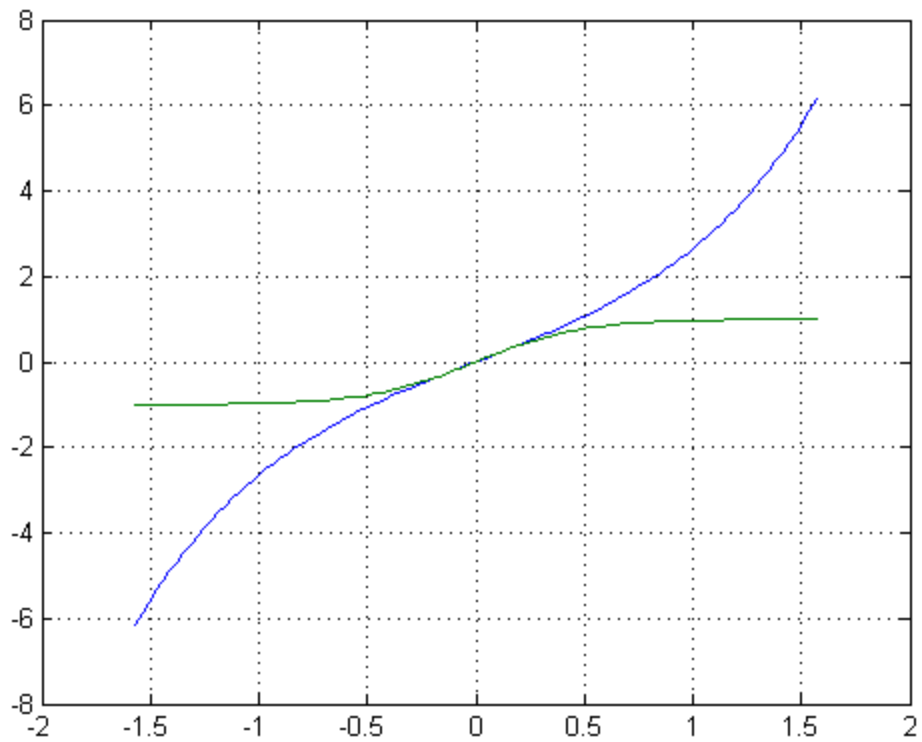
```
theta,Delta)
```

```
grid on
```



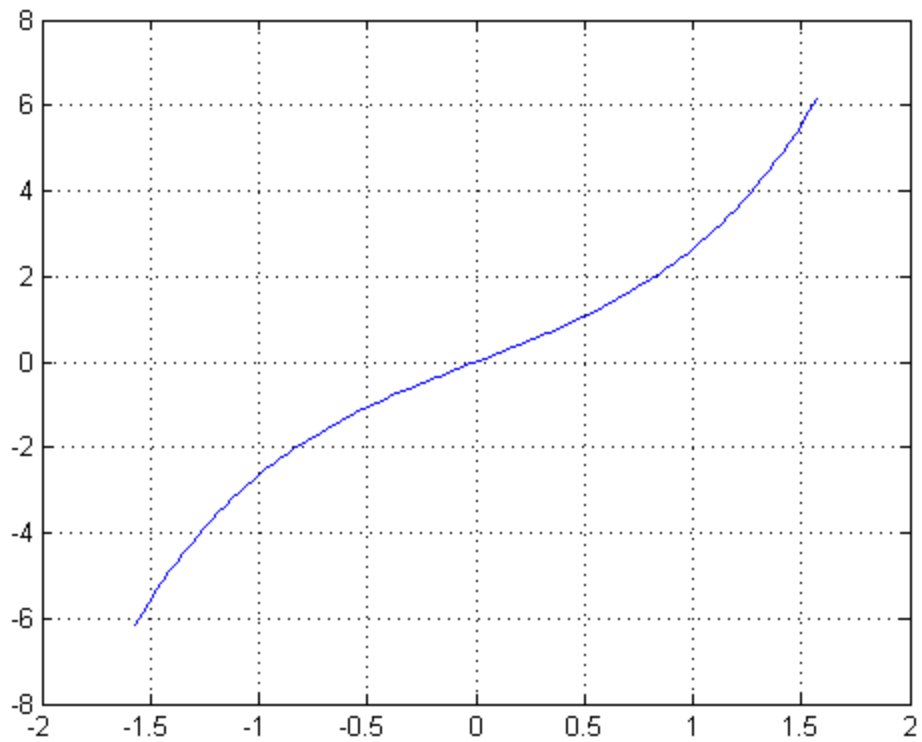
## Quick Look

```
plot(theta,Delta./Sigma,...  
      theta,tanh(3.*k.*theta.*theta_s))  
grid on
```



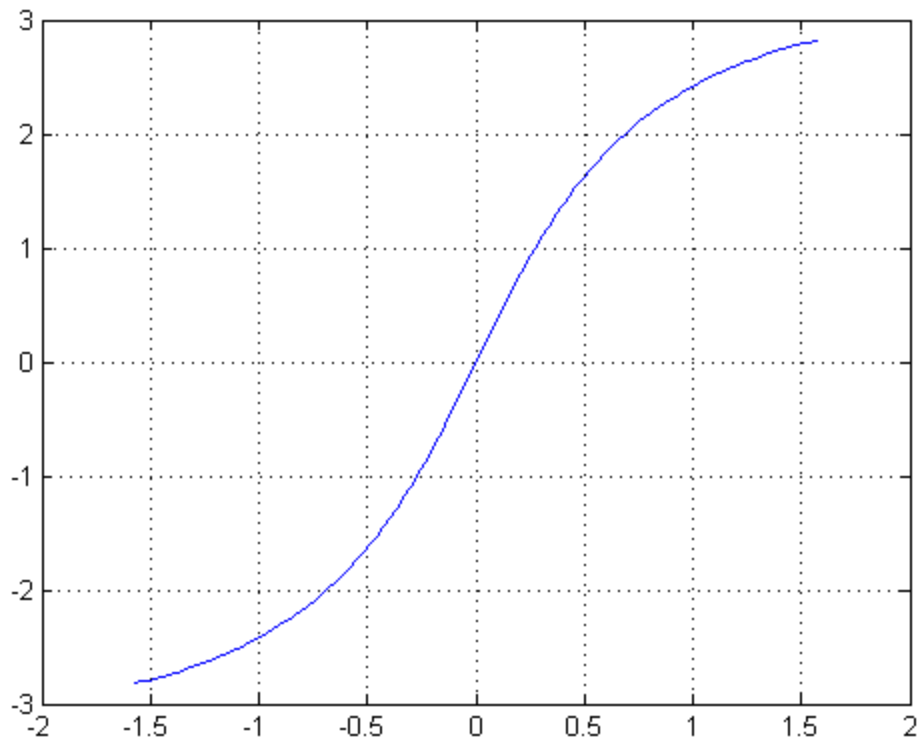
## amplitude monopulse

```
clf  
  
output = -abs(Delta./Sigma).*2.*(sign(angle(Delta./Sigma))-0.5);  
  
plot(theta,output)  
grid on
```



## phase monopulse

```
clf  
  
num = Sigma+j.*Delta;  
dem = Sigma-j.*Delta;  
ratio = num./dem;  
  
plot(theta,atan2(imag(ratio),real(ratio)))  
grid on
```



## introducing phase error

```

clf

clear num
clear dem

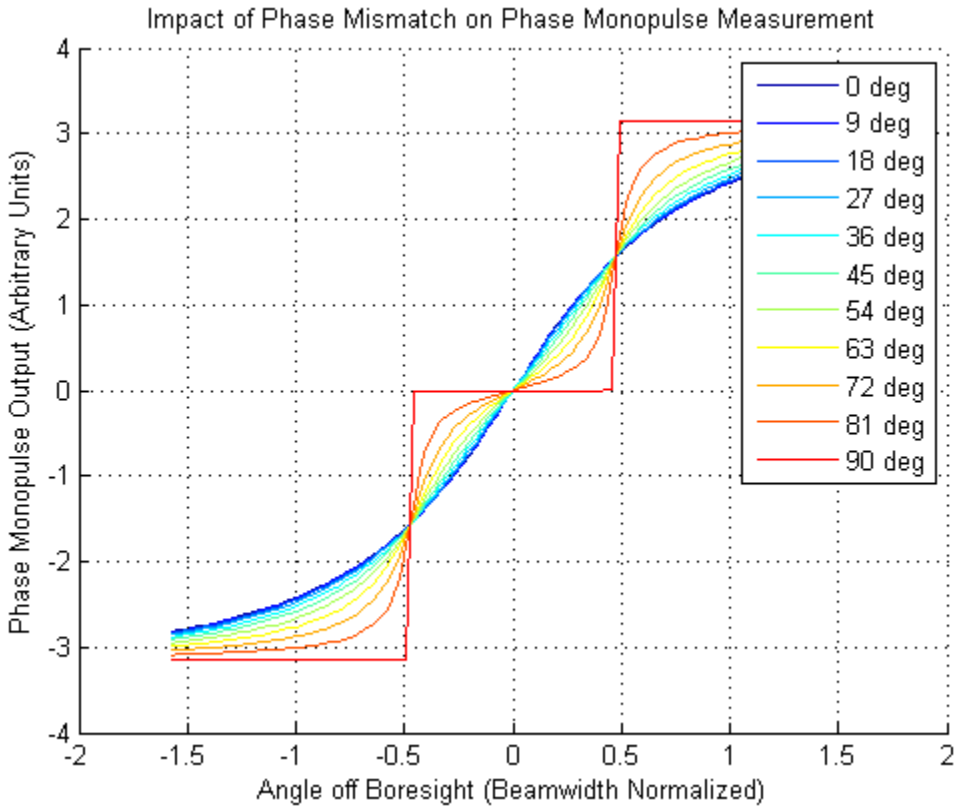
N = 11;

phaseError = linspace(0,90,N)*2*pi/360;
ColorSet = jet(N);
hold on
for ii=1:length(phaseError)
    %num = Sigma+j.*Delta.*exp(j*phaseError(ii));
    %dem = Sigma-j.*Delta.*exp(j*phaseError(ii));
    num = Sigma.*exp(j*phaseError(ii))+j.*Delta;
    dem = Sigma.*exp(j*phaseError(ii))-j.*Delta;
    %ratioError(ii,:) = num./dem;
    ratioError = num./dem;
    legendstr{ii} = [num2str(phaseError(ii)*360/(2*pi)), ' deg'];
    plot(theta,atan2(imag(ratioError),real(ratioError)),'Color',ColorSet(ii,:))
end
hold off

title('Impact of Phase Mismatch on Phase Monopulse Measurement')

```

```
ylabel('Phase Monopulse Output (Arbitrary Units)')
xlabel('Angle off Boresight (Beamwidth Normalized)')
legend(legendstr)
grid on
print('-dpng', 'PhaseErrorMonopulse.png')
```



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