Table of Contents


```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
%       "Exact dynamic response of smooth rigid retaining walls
%                        resting on bedrock"
%
% This Matlab script generates the results in the aforementioned
 paper, re-
% ferences to the actual text of the manuscript are included.
%
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%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
clear; close; clc;
```

Implementing the expressions obtained in Mathematica

```
%   This part of the code implents the solution coefficient detailed
 in
%   eqs(28) and eqs(29).
%
%Declare symbolic variables
syms k r delta nu eta
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
% Auxiliary parameters
c=sqrt(2*(1-nu)/(1-2*nu));                                  % ratio wave
 velocities
alpha=sqrt(k^2-r^2/(1+1i*delta));                           % s wavenumber
beta=sqrt(k^2-r^2/(1+1i*delta)*(1-2*nu)/2/(1-nu));  % p wavenumber
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
% The following corresponds to eq.(28a) over eq.(29a)
A=((2+exp(1).^((k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2).^(1/2))) ...

 .*((-1)+exp(1).^((k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2) ...

 .*nu).*(1+(-1).*nu).^(-1).*r.^2).^(1/2))).^2.*k.^4.*((-2)+2.*(1+( ...
-2).*nu).^(-1).*(1+(-1).*nu))+(-2).*exp(1).^((k.^2+(-1).*(1+sqrt( ...
```

```
-1).*delta).^(-1).*r.^2).^(1/2)).*(1+exp(1).^(2.*(k.^2+(-1/2).*(1+ ...

sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+(-1).*nu).^(-1).*r.^2).^( ...

1/2))).*(1+(-2).*nu).^(-1).*(1+(-1).*nu).*(k.^2+(-1).*(1+sqrt(-1) ...

.*delta).^(-1).*r.^2).*(k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).*( ...
 1+(-2).*nu).*(1+(-1).*nu).^(-1).*r.^2)+k.^2.*((-2).*exp(1).^(( ...

k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2).^(1/2)+(k.^2+(-1/2).*( ...

1+sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+(-1).*nu).^(-1).*r.^2) ...

.^(1/2)).*((-2)+2.*(1+(-2).*nu).^(-1).*(1+(-1).*nu)).*(k.^2+(-1).* ...

(1+sqrt(-1).*delta).^(-1).*r.^2)+(-2).*((-2)+2.*(1+(-2).*nu).^(-1) ...
 .*(1+(-1).*nu)).*(k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2).^( ...

1/2).*(k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+( ...

-1).*nu).^(-1).*r.^2).^(1/2)+2.*exp(1).^(2.*(k.^2+(-1/2).*(1+sqrt( ...

-1).*delta).^(-1).*(1+(-2).*nu).*(1+(-1).*nu).^(-1).*r.^2).^(1/2)) ...

.*((-2)+2.*(1+(-2).*nu).^(-1).*(1+(-1).*nu)).*(k.^2+(-1).*(1+sqrt( ...

-1).*delta).^(-1).*r.^2).^(1/2).*(k.^2+(-1/2).*(1+sqrt(-1).*delta) ...
 .^(-1).*(1+(-2).*nu).*(1+(-1).*nu).^(-1).*r.^2).^(1/2)+8.*exp(1) ...

.^((k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+(-1) ...
 .*nu).^(-1).*r.^2).^(1/2)).*(1+(-2).*nu).^(-1).*(1+(-1).*nu).*( ...

k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+(-1).*nu) ...
 .^(-1).*r.^2)+exp(1).^((k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).* ...

r.^2).^(1/2)).*(((-2)+2.*(1+(-2).*nu).^(-1).*(1+(-1).*nu)).*(k.^2+ ...

(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2)+(-4).*(k.^2+(-1).*(1+sqrt( ...

-1).*delta).^(-1).*r.^2).^(1/2).*(k.^2+(-1/2).*(1+sqrt(-1).*delta) ...

.^(-1).*(1+(-2).*nu).*(1+(-1).*nu).^(-1).*r.^2).^(1/2)+(-2).*(1+( ...

-2).*nu).^(-1).*(1+(-1).*nu).*(k.^2+(-1/2).*(1+sqrt(-1).*delta).^( ...

-1).*(1+(-2).*nu).*(1+(-1).*nu).^(-1).*r.^2))+exp(1).^((k.^2+(-1) ...
 .*(1+sqrt(-1).*delta).^(-1).*r.^2).^(1/2)+2.*(k.^2+(-1/2).*(1+ ...

sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+(-1).*nu).^(-1).*r.^2).^( ...

1/2)).*(((-2)+2.*(1+(-2).*nu).^(-1).*(1+(-1).*nu)).*(k.^2+(-1).*( ...

1+sqrt(-1).*delta).^(-1).*r.^2)+4.*(k.^2+(-1).*(1+sqrt(-1).*delta) ...
```

```
.^(-1).*r.^2).^(1/2).*(k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+ ...

(-2).*nu).*(1+(-1).*nu).^(-1).*r.^2).^(1/2)+(-2).*(1+(-2).*nu).^( ...
 -1).*(1+(-1).*nu).*(k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+( ...
 -2).*nu).*(1+(-1).*nu).^(-1).*r.^2))))/...

(2.*(1+(-2).*nu).^(-1).*(1+(-1).*nu).*(2.*pi).^(1/2).*(k.^2+(-1/2) ...
 .*(1+sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+(-1).*nu).^(-1).* ...

r.^2).^(1/2).*((1+exp(1).^(2.*(k.^2+(-1/2).*(1+sqrt(-1).*delta).^( ...

-1).*(1+(-2).*nu).*(1+(-1).*nu).^(-1).*r.^2).^(1/2))).*(k.^2+(-1) ...

.*(1+sqrt(-1).*delta).^(-1).*r.^2).^(1/2).*(k.^2+(-1/2).*(1+sqrt( ...

-1).*delta).^(-1).*(1+(-2).*nu).*(1+(-1).*nu).^(-1).*r.^2).^(1/2) ...

.*(k.^4.*(6+(-2).*(1+(-2).*nu).^(-1).*(1+(-1).*nu))+(-1).*k.^2.*(( ...

-2)+2.*(1+(-2).*nu).^(-1).*(1+(-1).*nu)).*(k.^2+(-1).*(1+sqrt(-1) ...
 .*delta).^(-1).*r.^2)+2.*(1+(-2).*nu).^(-1).*(1+(-1).*nu).*(2.* ...
 k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2).*(k.^2+(-1/2).*(1+ ...

sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+(-1).*nu).^(-1).*r.^2)).* ...

cosh((k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2).^(1/2))+2.*exp( ...
 1).^((k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+( ...
 -1).*nu).^(-1).*r.^2).^(1/2)).*k.^2.*((-2).*(k.^2+(-1).*(1+sqrt( ...

-1).*delta).^(-1).*r.^2).^(1/2).*(k.^2+(-1/2).*(1+sqrt(-1).*delta) ...
 .^(-1).*(1+(-2).*nu).*(1+(-1).*nu).^(-1).*r.^2).^(1/2).*(k.^2+ ...

k.^2.*(3+(-2).*(1+(-2).*nu).^(-1).*(1+(-1).*nu))+(-1).*(1+sqrt(-1) ...

.*delta).^(-1).*r.^2+2.*(1+(-2).*nu).^(-1).*(1+(-1).*nu).*(k.^2+( ...

-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+(-1).*nu).^(-1) ...
 .*r.^2))+(k.^2.*((-2)+2.*(1+(-2).*nu).^(-1).*(1+(-1).*nu)).*(2.* ...

k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2)+(-1).*(k.^2+(-1/2).*( ...

1+sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+(-1).*nu).^(-1).*r.^2) ...

.*(2.*k.^2.*(1+(-2).*nu).^(-1).*(1+(-1).*nu)+(4+2.*(1+(-2).*nu).^( ...

-1).*(1+(-1).*nu)).*(k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2))) ...

.*sinh((k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2).^(1/2)).*sinh( ...
 (k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+(-1).* ...
 nu).^(-1).*r.^2).^(1/2)))));
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
% The following corresponds to eq.(28b) over eq.(29b)
```

```
B=(1/4).*exp(1).^((-1).*(k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2) ...
  .^(1/2)+(-1).*(k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2).* ...

 nu).*(1+(-1).*nu).^(-1).*r.^2).^(1/2)).*(1+(-2).*nu).*(1+(-1).*nu) ...

 .^(-1).*(2.*pi).^(-1/2).*(k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).* ...

 (1+(-2).*nu).*(1+(-1).*nu).^(-1).*r.^2).^(-1/2).*((1+2.*exp(1).^(( ...

 k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2).^(1/2))).*((-1)+exp(1) ...

 .^((k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+(-1) ...

 .*nu).^(-1).*r.^2).^(1/2))).^2.*k.^4.*(2+(-2).*(1+(-2).*nu).^(-1) ...
  .*(1+(-1).*nu))+2.*(1+exp(1).^(2.*(k.^2+(-1/2).*(1+sqrt(-1).* ...

 delta).^(-1).*(1+(-2).*nu).*(1+(-1).*nu).^(-1).*r.^2).^(1/2))).*( ...
  1+(-2).*nu).^(-1).*(1+(-1).*nu).*(k.^2+(-1).*(1+sqrt(-1).*delta) ...

 .^(-1).*r.^2).*(k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2).* ...

 nu).*(1+(-1).*nu).^(-1).*r.^2)+k.^2.*(((-1)+exp(1).^((k.^2+(-1/2) ...
  .*(1+sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+(-1).*nu).^(-1).* ...
  r.^2).^(1/2))).^2.*(2+(-2).*(1+(-2).*nu).^(-1).*(1+(-1).*nu)).*( ...

 k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2)+2.*((-1)+exp(1).^(2.*( ...

 k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+(-1).*nu) ...
  .^(-1).*r.^2).^(1/2))).*(2+exp(1).^((k.^2+(-1).*(1+sqrt(-1).* ...

 delta).^(-1).*r.^2).^(1/2)).*((-2)+2.*(1+(-2).*nu).^(-1).*(1+(-1) ...
  .*nu))).*(k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2).^(1/2).*( ...

 k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+(-1).*nu) ...

 .^(-1).*r.^2).^(1/2)+2.*(1+exp(1).^(2.*(k.^2+(-1/2).*(1+sqrt(-1).* ...

 delta).^(-1).*(1+(-2).*nu).*(1+(-1).*nu).^(-1).*r.^2).^(1/2))+(-4) ...
  .*exp(1).^((k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2).^(1/2)+( ...

 k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+(-1).*nu) ...

 .^(-1).*r.^2).^(1/2))).*(1+(-2).*nu).^(-1).*(1+(-1).*nu).*(k.^2+( ...

 -1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+(-1).*nu).^(-1) ...

 .*r.^2))).*((k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2).^(1/2).*( ...

 k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+(-1).*nu) ...

 .^(-1).*r.^2).^(1/2).*(k.^4.*(6+(-2).*(1+(-2).*nu).^(-1).*(1+(-1) ...
  .*nu))+(-1).*k.^2.*((-2)+2.*(1+(-2).*nu).^(-1).*(1+(-1).*nu)).*( ...

 k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2)+2.*(1+(-2).*nu).^(-1) ...
```

```
.*(1+(-1).*nu).*(2.*k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2).*( ...

k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+(-1).*nu) ...

.^(-1).*r.^2)).*cosh((k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2) ...

.^(1/2)).*cosh((k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2).* ...

nu).*(1+(-1).*nu).^(-1).*r.^2).^(1/2))+k.^2.*((-2).*(k.^2+(-1).*( ...

1+sqrt(-1).*delta).^(-1).*r.^2).^(1/2).*(k.^2+(-1/2).*(1+sqrt(-1) ...

.*delta).^(-1).*(1+(-2).*nu).*(1+(-1).*nu).^(-1).*r.^2).^(1/2).*( ...
 k.^2+k.^2.*(3+(-2).*(1+(-2).*nu).^(-1).*(1+(-1).*nu))+(-1).*(1+ ...

sqrt(-1).*delta).^(-1).*r.^2+2.*(1+(-2).*nu).^(-1).*(1+(-1).*nu).* ...
 (k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+(-1).* ...

nu).^(-1).*r.^2))+(k.^2.*((-2)+2.*(1+(-2).*nu).^(-1).*(1+(-1).*nu) ...
 ).*(2.*k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2)+(-1).*(k.^2+( ...

-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+(-1).*nu).^(-1) ...

.*r.^2).*(2.*k.^2.*(1+(-2).*nu).^(-1).*(1+(-1).*nu)+(4+2.*(1+(-2) ...

.*nu).^(-1).*(1+(-1).*nu)).*(k.^2+(-1).*(1+sqrt(-1).*delta).^(-1) ...
 .*r.^2))).*sinh((k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2).^( ...

1/2)).*sinh((k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2).*nu) ...
  .*(1+(-1).*nu).^(-1).*r.^2).^(1/2)))).^(-1);
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%
% The following corresponds to eq.(28c) over eq.(29c)
C=(1/2).*(1+(-2).*nu).*(1+(-1).*nu).^(-1).*(2.*pi).^(-1/2).*(k.^2+( ...

 -1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+(-1).*nu).^(-1) ...

 .*r.^2).^(-1/2).*(2.*(k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2) ...

 .^(1/2).*(k.^2+k.^2.*(1+(-1).*exp(1).^((k.^2+(-1/2).*(1+sqrt(-1).* ...

 delta).^(-1).*(1+(-2).*nu).*(1+(-1).*nu).^(-1).*r.^2).^(1/2)).*(( ...
  -2)+2.*(1+(-2).*nu).^(-1).*(1+(-1).*nu)))+(-1).*(1+sqrt(-1).* ...

 delta).^(-1).*r.^2).*(k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+( ...

 -2).*nu).*(1+(-1).*nu).^(-1).*r.^2).^(1/2)+(k.^2+(-1).*(1+sqrt(-1) ...

 .*delta).^(-1).*r.^2).^(1/2).*(k.^2+(-1/2).*(1+sqrt(-1).*delta).^( ...

 -1).*(1+(-2).*nu).*(1+(-1).*nu).^(-1).*r.^2).^(1/2).*((-4).*exp(1) ...

 .^((k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+(-1) ...
```

```
.*nu).^(-1).*r.^2).^(1/2)).*k.^2+((-2)+2.*(1+(-2).*nu).^(-1).*(1+( ...

-1).*nu)).*(2.*k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2)).*cosh( ...
 (k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2).^(1/2))+(-1).*(2.* ...
 k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2).*(((-1)+exp(1).^(( ...

k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+(-1).*nu) ...

.^(-1).*r.^2).^(1/2))).*k.^2.*((-2)+2.*(1+(-2).*nu).^(-1).*(1+(-1) ...

.*nu))+(-2).*exp(1).^((k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+ ...

(-2).*nu).*(1+(-1).*nu).^(-1).*r.^2).^(1/2)).*(1+(-2).*nu).^(-1).* ...
 (1+(-1).*nu).*(k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2).* ...
 nu).*(1+(-1).*nu).^(-1).*r.^2)).*sinh((k.^2+(-1).*(1+sqrt(-1).* ...

delta).^(-1).*r.^2).^(1/2))).*((k.^2+(-1).*(1+sqrt(-1).*delta).^( ...
 -1).*r.^2).^(1/2).*(k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+( ...
 -2).*nu).*(1+(-1).*nu).^(-1).*r.^2).^(1/2).*(k.^4.*(6+(-2).*(1+( ...

-2).*nu).^(-1).*(1+(-1).*nu))+(-1).*k.^2.*((-2)+2.*(1+(-2).*nu).^( ...

-1).*(1+(-1).*nu)).*(k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2)+ ...

2.*(1+(-2).*nu).^(-1).*(1+(-1).*nu).*(2.*k.^2+(-1).*(1+sqrt(-1).* ...

delta).^(-1).*r.^2).*(k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+( ...

-2).*nu).*(1+(-1).*nu).^(-1).*r.^2)).*cosh((k.^2+(-1).*(1+sqrt(-1) ...
 .*delta).^(-1).*r.^2).^(1/2)).*cosh((k.^2+(-1/2).*(1+sqrt(-1).* ...
 delta).^(-1).*(1+(-2).*nu).*(1+(-1).*nu).^(-1).*r.^2).^(1/2))+ ...

k.^2.*((-2).*(k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2).^(1/2).* ...
 (k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+(-1).* ...

nu).^(-1).*r.^2).^(1/2).*(k.^2+k.^2.*(3+(-2).*(1+(-2).*nu).^(-1).* ...
 (1+(-1).*nu))+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2+2.*(1+(-2).* ...

nu).^(-1).*(1+(-1).*nu).*(k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).* ...

(1+(-2).*nu).*(1+(-1).*nu).^(-1).*r.^2))+(k.^2.*((-2)+2.*(1+(-2).* ...

nu).^(-1).*(1+(-1).*nu)).*(2.*k.^2+(-1).*(1+sqrt(-1).*delta).^(-1) ...
 .*r.^2)+(-1).*(k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2).* ...

nu).*(1+(-1).*nu).^(-1).*r.^2).*(2.*k.^2.*(1+(-2).*nu).^(-1).*(1+( ...

-1).*nu)+(4+2.*(1+(-2).*nu).^(-1).*(1+(-1).*nu)).*(k.^2+(-1).*(1+ ...
 sqrt(-1).*delta).^(-1).*r.^2))).*sinh((k.^2+(-1).*(1+sqrt(-1).* ...
 delta).^(-1).*r.^2).^(1/2)).*sinh((k.^2+(-1/2).*(1+sqrt(-1).* ...

delta).^(-1).*(1+(-2).*nu).*(1+(-1).*nu).^(-1).*r.^2).^(1/2)))).^( ...
 -1);
```

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%
% The following corresponds to eq.(28d) over eq.(29d)
D=(1/4).*exp(1).^((-1).*(k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2) ...
  .^(1/2)+(-1).*(k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2).* ...

 nu).*(1+(-1).*nu).^(-1).*r.^2).^(1/2)).*(1+(-2).*nu).*(1+(-1).*nu) ...

 .^(-1).*(2.*pi).^(-1/2).*(k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).* ...

 (1+(-2).*nu).*(1+(-1).*nu).^(-1).*r.^2).^(-1/2).*(((-1)+exp(1).^( ...
  2.*(k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2).^(1/2))).*((-1)+ ...

 exp(1).^((k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*( ...

 1+(-1).*nu).^(-1).*r.^2).^(1/2))).*k.^4.*((-2)+2.*(1+(-2).*nu).^( ...

 -1).*(1+(-1).*nu))+(k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2).*( ...

 k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+(-1).*nu) ...
  .^(-1).*r.^2).^(1/2).*(2.*((-1)+exp(1).^(2.*(k.^2+(-1).*(1+sqrt( ...
  -1).*delta).^(-1).*r.^2).^(1/2))).*(1+(-2).*nu).^(-1).*(1+(-1).* ...
  nu).*(k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+( ...
  -1).*nu).^(-1).*r.^2).^(1/2)+(-2).*exp(1).^((k.^2+(-1).*(1+sqrt( ...

 -1).*delta).^(-1).*r.^2).^(1/2)+(k.^2+(-1/2).*(1+sqrt(-1).*delta) ...
  .^(-1).*(1+(-2).*nu).*(1+(-1).*nu).^(-1).*r.^2).^(1/2)).*(k.^2+( ...

 -1).*(1+sqrt(-1).*delta).^(-1).*r.^2).^(1/2).*(2+((-2)+2.*(1+(-2) ...
  .*nu).^(-1).*(1+(-1).*nu)).*cosh((k.^2+(-1).*(1+sqrt(-1).*delta) ...
  .^(-1).*r.^2).^(1/2))))+k.^2.*(((-1)+exp(1).^(2.*(k.^2+(-1).*(1+ ...
  sqrt(-1).*delta).^(-1).*r.^2).^(1/2))).*((-1)+exp(1).^((k.^2+( ...

 -1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+(-1).*nu).^(-1) ...
  .*r.^2).^(1/2))).*((-2)+2.*(1+(-2).*nu).^(-1).*(1+(-1).*nu)).*( ...
  k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2)+4.*(k.^2+(-1).*(1+ ...

 sqrt(-1).*delta).^(-1).*r.^2).^(1/2).*(k.^2+(-1/2).*(1+sqrt(-1).* ...

 delta).^(-1).*(1+(-2).*nu).*(1+(-1).*nu).^(-1).*r.^2).^(1/2)+2.*(( ...
  -1)+exp(1).^(2.*(k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2).^( ...
  1/2))).*(1+(-2).*nu).^(-1).*(1+(-1).*nu).*(k.^2+(-1/2).*(1+sqrt( ...

 -1).*delta).^(-1).*(1+(-2).*nu).*(1+(-1).*nu).^(-1).*r.^2)+(-2).* ...
  exp(1).^((k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2).^(1/2)).*( ...

 k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2).^(1/2).*(k.^2+(-1/2).* ...

 (1+sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+(-1).*nu).^(-1).*r.^2) ...

 .^(1/2).*((-2).*((-2)+exp(1).^((k.^2+(-1).*(1+sqrt(-1).*delta).^( ...

 -1).*r.^2).^(1/2))+2.*(1+(-2).*nu).^(-1).*(1+(-1).*nu))+exp(1).^(( ...
```

```
k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+(-1).*nu) ...
 .^(-1).*r.^2).^(1/2)).*(2+((-2)+2.*(1+(-2).*nu).^(-1).*(1+(-1).* ...

nu)).*cosh((k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2).^(1/2))))) ...
 ).*((k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2).^(1/2).*(k.^2+( ...

-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+(-1).*nu).^(-1) ...

.*r.^2).^(1/2).*(k.^4.*(6+(-2).*(1+(-2).*nu).^(-1).*(1+(-1).*nu))+ ...

(-1).*k.^2.*((-2)+2.*(1+(-2).*nu).^(-1).*(1+(-1).*nu)).*(k.^2+(-1) ...

.*(1+sqrt(-1).*delta).^(-1).*r.^2)+2.*(1+(-2).*nu).^(-1).*(1+(-1) ...
 .*nu).*(2.*k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2).*(k.^2+( ...

-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+(-1).*nu).^(-1) ...

.*r.^2)).*cosh((k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2).^(1/2) ...

).*cosh((k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+ ...
 (-1).*nu).^(-1).*r.^2).^(1/2))+k.^2.*((-2).*(k.^2+(-1).*(1+sqrt( ...

-1).*delta).^(-1).*r.^2).^(1/2).*(k.^2+(-1/2).*(1+sqrt(-1).*delta) ...
 .^(-1).*(1+(-2).*nu).*(1+(-1).*nu).^(-1).*r.^2).^(1/2).*(k.^2+ ...

k.^2.*(3+(-2).*(1+(-2).*nu).^(-1).*(1+(-1).*nu))+(-1).*(1+sqrt(-1) ...

.*delta).^(-1).*r.^2+2.*(1+(-2).*nu).^(-1).*(1+(-1).*nu).*(k.^2+( ...

-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+(-1).*nu).^(-1) ...
 .*r.^2))+(k.^2.*((-2)+2.*(1+(-2).*nu).^(-1).*(1+(-1).*nu)).*(2.* ...

k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2)+(-1).*(k.^2+(-1/2).*( ...

1+sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+(-1).*nu).^(-1).*r.^2) ...

.*(2.*k.^2.*(1+(-2).*nu).^(-1).*(1+(-1).*nu)+(4+2.*(1+(-2).*nu).^( ...

-1).*(1+(-1).*nu)).*(k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2))) ...

.*sinh((k.^2+(-1).*(1+sqrt(-1).*delta).^(-1).*r.^2).^(1/2)).*sinh( ...
 (k.^2+(-1/2).*(1+sqrt(-1).*delta).^(-1).*(1+(-2).*nu).*(1+(-1).* ...
 nu).^(-1).*r.^2).^(1/2)))).^(-1);
```

Converting the coefficients into Matlab function handles:

The following lines implement the integrands, which depends on {A,B,C,D}, that later will be integrated numerically to find the variables of interest.

Integrand of eq.(30b)

```
vtop_int=matlabFunction(A*exp(-alpha)+B*exp(alpha)+C*exp(-
beta)+D*exp(beta),...
'Vars',{k,r,delta,nu});
%
% Integrand of eq.(32):
Q_int=matlabFunction(sqrt(2/pi)/beta^2+...
    A*(c^2-2*exp(-alpha))+B*(c^2-2*exp(alpha))+...
    (c^2*(1-(k/beta)^2)-2)*...
    (C*exp(-beta)+D*exp(beta))+...
    (c*k/beta)^2*(C+D),...
    'Vars',{k,r,delta,nu});
% Integrand of eq.(33):
sigma_int=matlabFunction(sqrt(2/pi)/beta^2+...
    2*alpha*(A*exp(-alpha*eta)-B*exp(alpha*eta))...
    -beta*(c^2*(1-(k/beta)^2)-2)*...
    (C*exp(-beta*eta)-D*exp(beta*eta)),...
    'Vars',{eta,k,r,delta,nu});
%
% Integrand of eq.(35):
dudx_int=matlabFunction(sqrt(2/pi)/(c*beta)^2-...
    A*(exp(-alpha)-1)-B*(exp(alpha)-1)-...
    (k/beta)^2*...
    (C*(exp(-beta)-1)+D*(exp(beta)-1)),...
    'Vars',{k,r,delta,nu});
% Integrand of eq.(37), for eta=1:
intq1_int=matlabFunction(sqrt(2/pi)/2/beta^2+...
    A*(c^2+2*(exp(-alpha)-1)/alpha)+...
    B*(c^2-2*(exp(alpha)-1)/alpha)+...
    (c^2*(1-(k/beta)^2)-2)/beta*...
    (-C*(exp(-beta)-1)+D*(exp(beta)-1))+...
    (c*k/beta)^2*(C+D),...
    'Vars',{k,r,delta,nu});
```

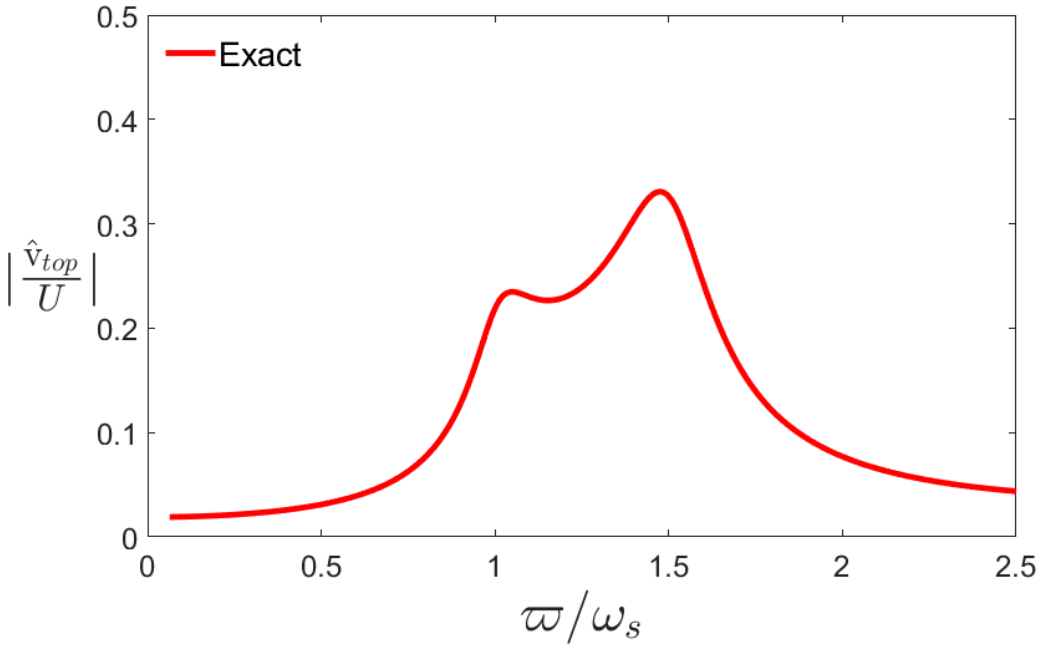
Figures that involve Vertical displacement at the top of the wall

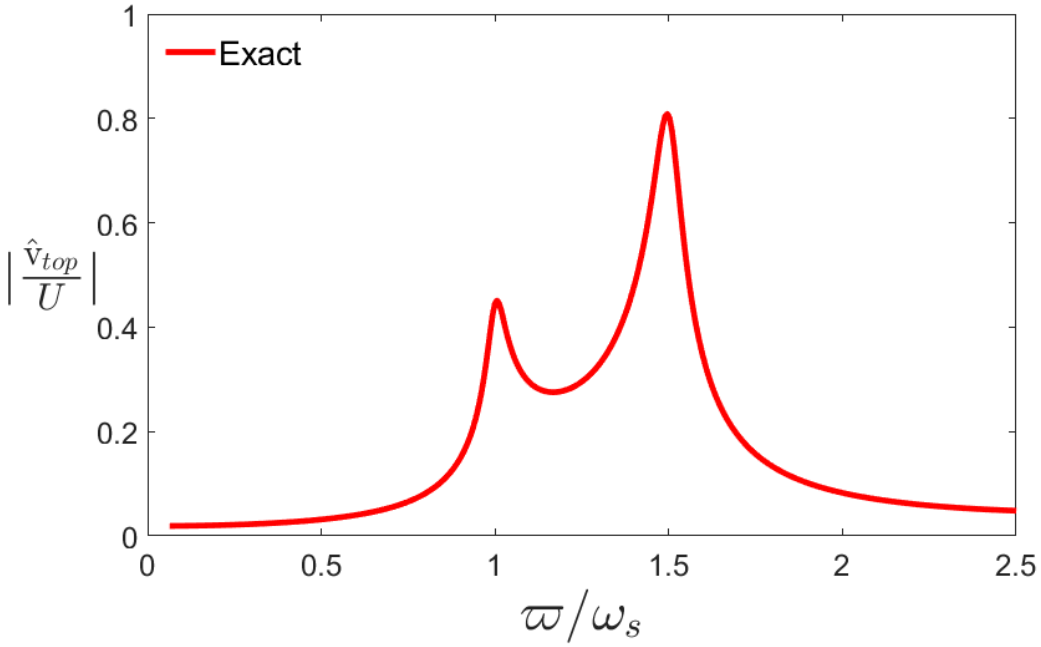
```
% Figure 7 ----------------------------------------------
DE=0.16; NU=0.1;
RR=(10:400)/100;
vtop_DE016_NU010=zeros(size(RR));
for ii=1:length(RR)
    vtop_DE016_NU010(ii)=...
        integral(@(k)vtop_int(k,RR(ii),DE,NU)*2/sqrt(2*pi),0,10);
end
FigHandle=figure(7);
set(FigHandle,'PaperUnits','centimeters');
set(FigHandle,'Resize','off');
set(FigHandle,'PaperPositionMode','manual');
set(FigHandle,'PaperPosition',[0 0 9 6]);
set(FigHandle,'PaperSize',[9 6]); %columnwidth = 9cm
set(FigHandle, 'Position', [50, 100, 900, 550])
set(FigHandle,'defaultAxesFontName', 'Times-Roman')
```

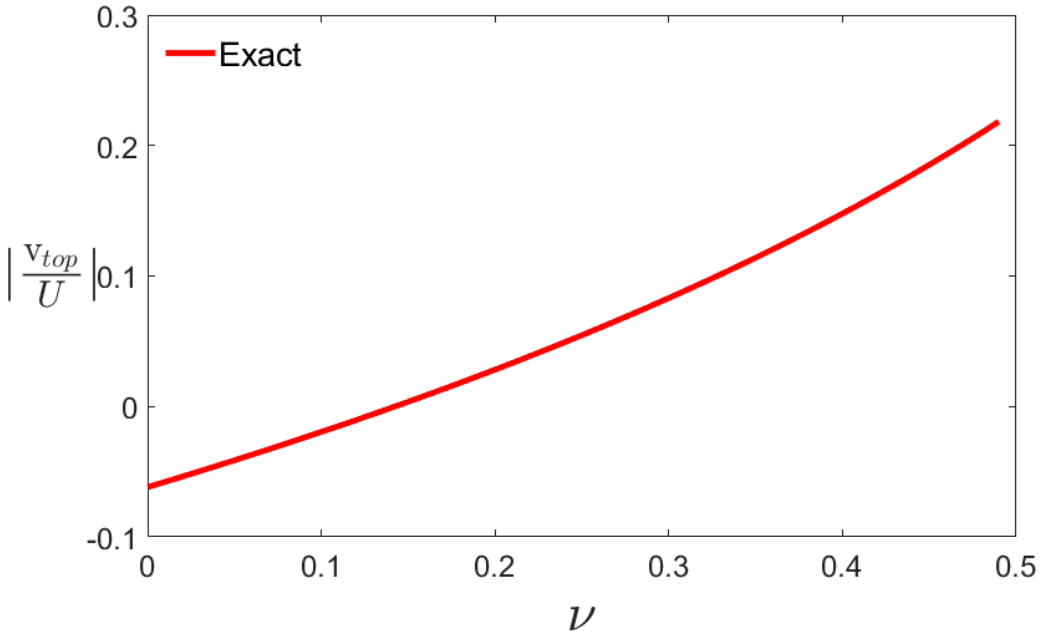
```
set(FigHandle,'defaultTextFontName', 'Times-Roman')
set(gcf,'color','w');
plot(RR/pi*2,abs(vtop_DE016_NU010),'color',[1,0,0],'Linewidth',3.5)
axis([0 2.5 0 0.5])
ax=gca;
ax.XAxis.FontSize = 18;
ax.YAxis.FontSize = 18;
xticks(0:0.25:6)
xlabel('$\varpi/\omega_s$','interpreter','latex','fontsize',32)
xticks([0 0.5 1 1.5 2 2.5]);
y=ylabel('$|\frac{\hat{\mathrm{v}}_{top}}{U}|
$','interpreter','latex','fontsize',32,'FontAngle','italic');
set(y, 'Units', 'Normalized', 'Position', [-0.11, 0.5, 0]);
hYLabel = get(gca,'YLabel');
set(hYLabel,'rotation',0,'VerticalAlignment','middle')

hh=legend('Exact');
set(hh,'fontsize',20)
set(hh,'Location','northwest')
legend boxoff
%-------------------------------------------------------------------------
% Figure 8 ----------------------------------------------
DE=0.05; NU=0.1;
vtop_DE005_NU010=zeros(size(RR));
for ii=1:length(RR)
    vtop_DE005_NU010(ii)=...
        integral(@(k)vtop_int(k,RR(ii),DE,NU)*2/sqrt(2*pi),0,10);
end
FigHandle=figure(8);
set(FigHandle,'PaperUnits','centimeters');
set(FigHandle,'Resize','off');
set(FigHandle,'PaperPositionMode','manual');
set(FigHandle,'PaperPosition',[0 0 9 6]);
set(FigHandle,'PaperSize',[9 6]); %columnwidth = 9cm
set(FigHandle, 'Position', [50, 100, 900, 550])
set(FigHandle,'defaultAxesFontName', 'Times-Roman')
set(FigHandle,'defaultTextFontName', 'Times-Roman')
set(gcf,'color','w');
plot(RR/pi*2,abs(vtop_DE005_NU010),'color',[1,0,0],'Linewidth',3.5)
axis([0 2.5 0 1])
ax=gca;
ax.XAxis.FontSize = 18;
ax.YAxis.FontSize = 18;
xticks(0:0.25:6)
xlabel('$\varpi/\omega_s$','interpreter','latex','fontsize',32)
xticks([0 0.5 1 1.5 2 2.5]);
y=ylabel('$|\frac{\hat{\mathrm{v}}_{top}}{U}|
$','interpreter','latex','fontsize',32,'FontAngle','italic');
set(y, 'Units', 'Normalized', 'Position', [-0.11, 0.5, 0]);
hYLabel = get(gca,'YLabel');
set(hYLabel,'rotation',0,'VerticalAlignment','middle')

hh=legend('Exact');
set(hh,'fontsize',20)
```

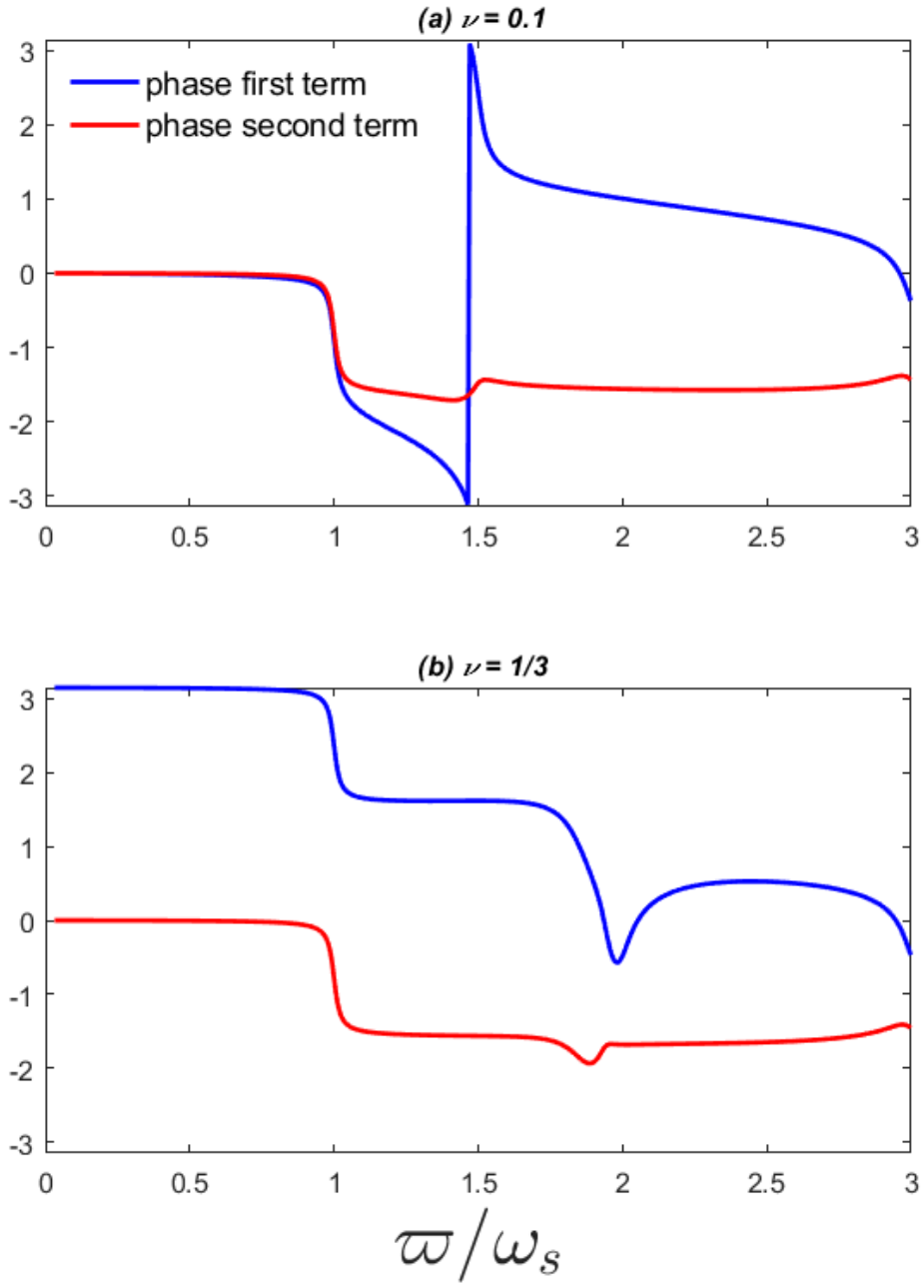
```
set(hh,'Location','northwest')
legend boxoff
%-------------------------------------------------------------------------
% Figure 11 ----------------------------------------------


DE=0.05; RR=0.2;
NU=0.0:0.01:0.49;
vtop_R02_DE005_NU010=zeros(size(NU));
for ii=1:length(NU)
    vtop_R02_DE005_NU010(ii)=...
        integral(@(k)vtop_int(k,RR,DE,NU(ii)),0,10)*2/sqrt(2*pi);
end
FigHandle=figure(11);
set(FigHandle,'PaperUnits','centimeters');
set(FigHandle,'Resize','off');
set(FigHandle,'PaperPositionMode','manual');
set(FigHandle,'PaperPosition',[0 0 9 6]);
set(FigHandle,'PaperSize',[9 6]); %columnwidth = 9cm
set(FigHandle, 'Position', [50, 100, 900, 550])
set(FigHandle,'defaultAxesFontName', 'Times-Roman')
set(FigHandle,'defaultTextFontName', 'Times-Roman')
set(gcf,'color','w');
plot(NU,-real(vtop_R02_DE005_NU010),'color',[1,0,0],'Linewidth',3.5)
axis([0 0.5 -0.1 0.3])
ax=gca;
ax.XAxis.FontSize = 18;
ax.YAxis.FontSize = 18;
xticks(0:0.25:6)
xlabel('$\nu$','interpreter','latex','fontsize',32)
xticks(0:0.1:0.5);
yticks(-0.1:0.1:0.3);
y=ylabel('$|\frac{\mathrm{v}_{top}}{U}|
$','interpreter','latex','fontsize',32,'FontAngle','italic');
set(y, 'Units', 'Normalized', 'Position', [-0.11, 0.5, 0]);
hYLabel = get(gca,'YLabel');
set(hYLabel,'rotation',0,'VerticalAlignment','middle')

hh=legend('Exact');
set(hh,'fontsize',20)
set(hh,'Location','northwest')
legend boxoff

% Figure 12 ----------------------------------------------
NUa=0.1; NUb=1/3; DE=0.03;
RR=(5:300*pi/2)/100;
vtop_DE003_NU010=zeros(size(RR));
dudx_DE003_NU010=zeros(size(RR));
vtop_DE003_NU033=zeros(size(RR));
dudx_DE003_NU033=zeros(size(RR));
for ii=1:length(RR)
    vtop_DE003_NU010(ii)=...
        integral(@(k)vtop_int(k,RR(ii),DE,NUa)*2/sqrt(2*pi),0,10);
    dudx_DE003_NU010(ii)=...
```

```
        integral(@(k)dudx_int(k,RR(ii),DE,NUa)*2/sqrt(2*pi),0,10);
    vtop_DE003_NU033(ii)=...
        integral(@(k)vtop_int(k,RR(ii),DE,NUb)*2/sqrt(2*pi),0,10);
    dudx_DE003_NU033(ii)=...
        integral(@(k)dudx_int(k,RR(ii),DE,NUb)*2/sqrt(2*pi),0,10);
end

FigHandle=figure(12);
set(FigHandle,'PaperUnits','centimeters');
set(FigHandle,'Resize','off');
set(FigHandle,'PaperPositionMode','manual');
set(FigHandle,'PaperPosition',[0 0 9 6]);
set(FigHandle,'PaperSize',[9 6]); %columnwidth = 9cm
set(FigHandle, 'Position', [0, 0, 650, 1200])
set(FigHandle,'defaultAxesFontName', 'Times-Roman')
set(FigHandle,'defaultTextFontName', 'Times-Roman')
set(gcf,'color','w');
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
subplot(2,1,1)
plot(RR*2/pi,angle(vtop_DE003_NU010),'color',[0,0,1],'Linewidth',2.)
hold on
plot(RR*2/pi,angle(dudx_DE003_NU010),'color',[1,0,0],'Linewidth',2.)
axis([0 3 -pi pi])
xticks([0 0.5 1 1.5 2 2.5 3]);
ax=gca;
ax.XAxis.FontSize = 12;
ax.YAxis.FontSize = 12;

hh=legend('phase first term','phase second term');
set(hh,'fontsize',14)
set(hh,'Location','northwest')
legend boxoff

title('\it (a) \nu = 0.1')
ax=gca;
ax.Title.FontSize = 12;

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
subplot(2,1,2)
plot(RR*2/pi,angle(vtop_DE003_NU033),'color',[0,0,1],'Linewidth',2.)
hold on
plot(RR*2/pi,angle(dudx_DE003_NU033),'color',[1,0,0],'Linewidth',2.)
axis([0 3 -pi pi])
xticks([0 0.5 1 1.5 2 2.5 3]);
ax=gca;
ax.XAxis.FontSize = 12;
ax.YAxis.FontSize = 12;
xlabel('$\varpi/\omega_s$','interpreter','latex','fontsize',32)

title('\it (b) \nu = 1/3')
ax=gca;
ax.Title.FontSize = 12;
```


Exact
0.5
0.4
0.3
0.2
0.1
0
0
0.5
1
1.5
2
2.5
$\left|\frac{\hat{\mathrm{v}}_{top}}{U}\right|$
ϖ/ω_s


Exact
1
0.8
0.6
0.4
0.2
0
0
0.5
1
1.5
2
2.5
$\left|\frac{\hat{\mathrm{v}}_{top}}{U}\right|$
ϖ/ω_s


Exact
0.3
0.2
0.1
0
-0.1
0
0.1
0.2
0.3
0.4
0.5
$\left|\frac{\mathrm{v}_{top}}{U}\right|$
ν



Figures involving the Earth Thrust

Figure 9 ----------

```
DE=0.01; NU=1/3;
RR=(10:350*pi/2)/100;
Q_DE001_NU033=zeros(size(RR));
for ii=1:length(RR)
    Q_DE001_NU033(ii)=...
```

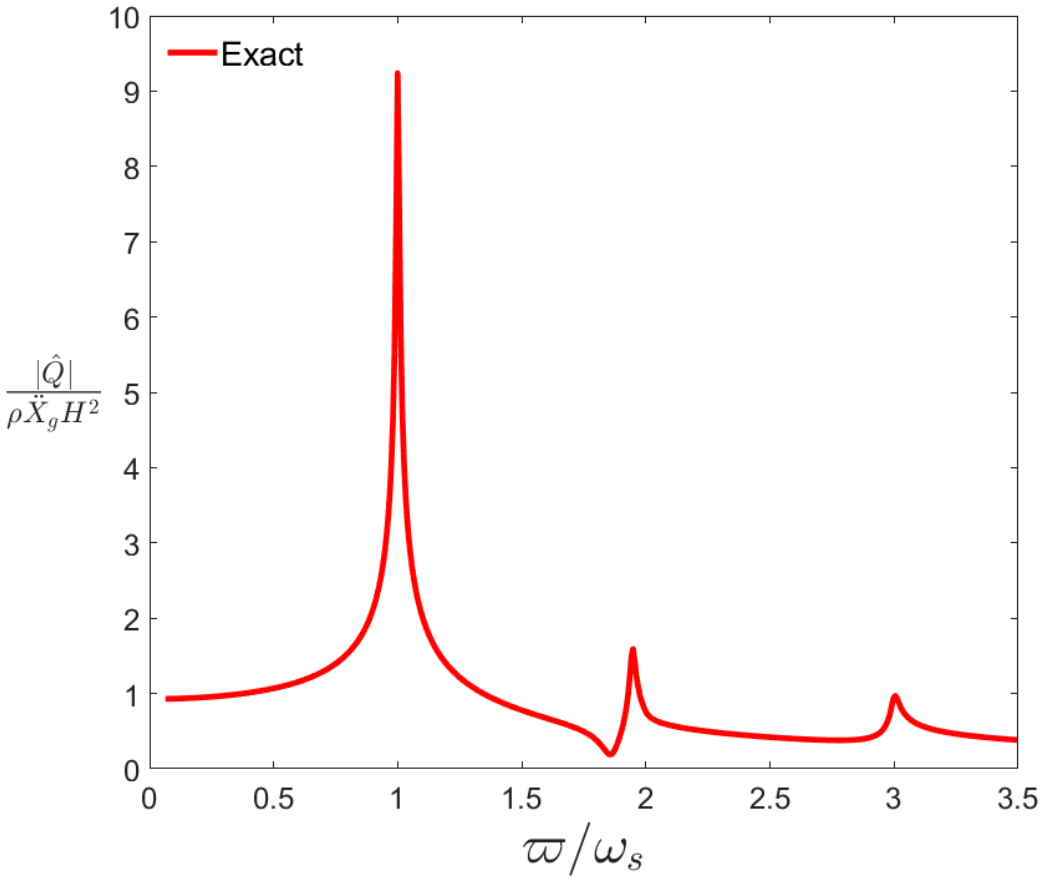
```
        integral(@(k)Q_int(k,RR(ii),DE,NU)*2/sqrt(2*pi),0,10);
end
FigHandle=figure(9);
set(FigHandle,'PaperUnits','centimeters');
set(FigHandle,'Resize','off');
set(FigHandle,'PaperPositionMode','manual');
set(FigHandle,'PaperPosition',[0 0 9 6]);
set(FigHandle,'PaperSize',[9 6]); %columnwidth = 9cm
set(FigHandle, 'Position', [50, 100, 900, 750])
set(FigHandle,'defaultAxesFontName', 'Times-Roman')
set(FigHandle,'defaultTextFontName', 'Times-Roman')
set(gcf,'color','w');
plot(RR/pi*2,abs(Q_DE001_NU033),'color',[1,0,0],'Linewidth',3.5)
axis([0 3.5 0 10])
ax=gca;
ax.XAxis.FontSize = 18;
ax.YAxis.FontSize = 18;
xticks(0:0.5:3.5)
yticks(0:10);
xlabel('$\varpi/\omega_s$','interpreter','latex','fontsize',32)
y=ylabel('$\frac{|\hat{Q}|}{\rho \ddot{X}_g
 H^2}$','interpreter','latex','fontsize',26,'FontAngle','italic');
set(y, 'Units', 'Normalized', 'Position', [-0.11, 0.5, 0]);
hYLabel = get(gca,'YLabel');
set(hYLabel,'rotation',0,'VerticalAlignment','middle')

hh=legend('Exact');
set(hh,'fontsize',20)
set(hh,'Location','northwest')
legend boxoff

% Figure 10
 ------------------------------------------------------------------
FigHandle=figure(10);
set(FigHandle,'PaperUnits','centimeters');
set(FigHandle,'Resize','off');
set(FigHandle,'PaperPositionMode','manual');
set(FigHandle,'PaperPosition',[0 0 9 6]);
set(FigHandle,'PaperSize',[9 6]); %columnwidth = 9cm
set(FigHandle, 'Position', [0, 0, 650, 1200])
set(FigHandle,'defaultAxesFontName', 'Times-Roman')
set(FigHandle,'defaultTextFontName', 'Times-Roman')
set(gcf,'color','w');
%%%%%%%%%%%%%%%
DE=0.05; NU=0.1;
Q_DE005_NU010=zeros(size(RR));
for ii=1:length(RR)
    Q_DE005_NU010(ii)=...
        integral(@(k)Q_int(k,RR(ii),DE,NU)*2/sqrt(2*pi),0,10);
end
%%%%%%%%%%%%%%%
subplot(3,1,1)

plot(RR/pi*2,abs(Q_DE005_NU010),'color',[1,0,0],'Linewidth',3.5)
```

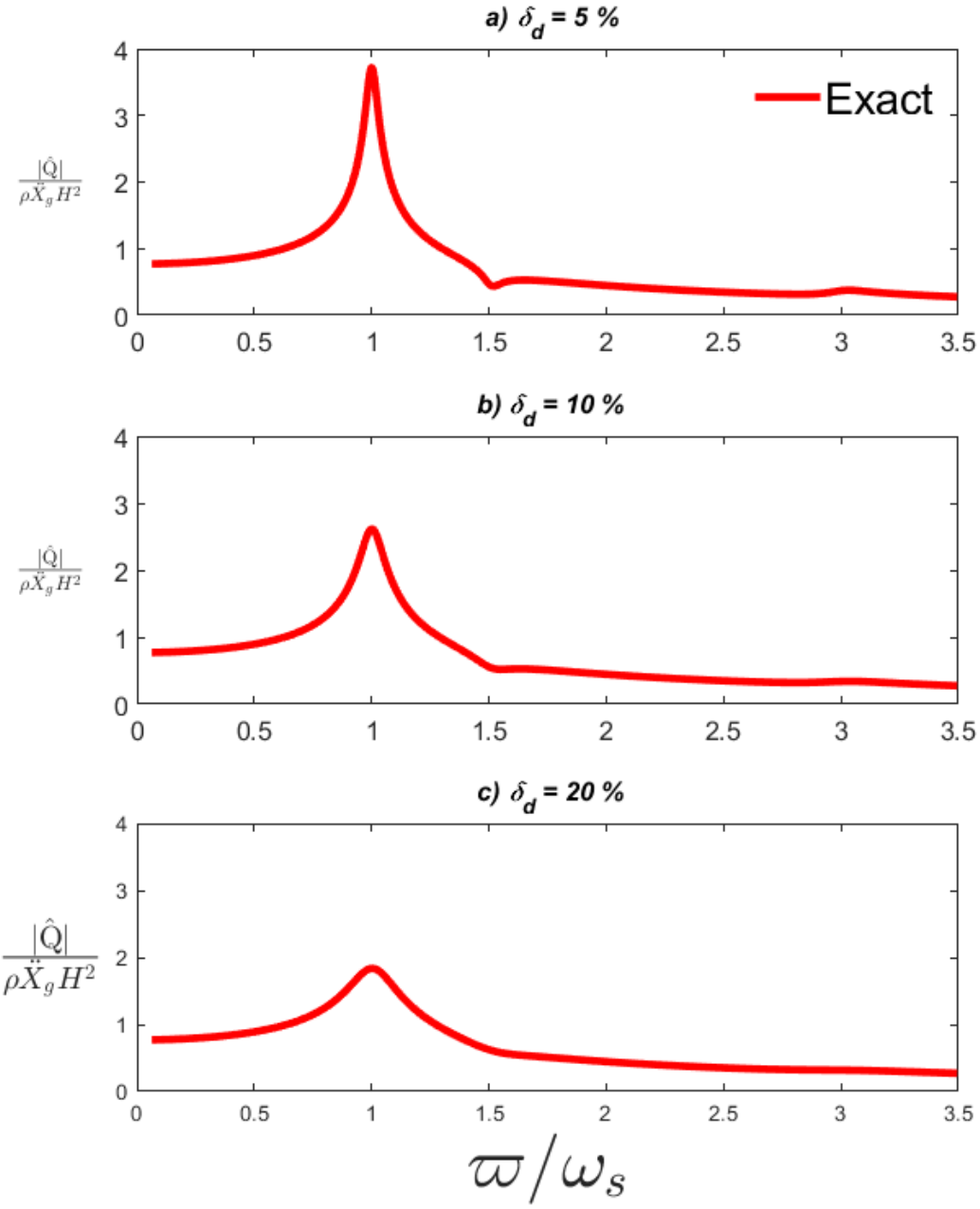
```
axis([0 3.5 0 4])
xticks([0 0.5 1 1.5 2 2.5 3 3.5]);
yticks(0:1:10)
ax=gca;
ax.XAxis.FontSize = 12;
ax.YAxis.FontSize = 12;
%xlabel('$\varpi/\omega_s$','interpreter','latex','fontsize',32)
y=ylabel('$\frac{|\hat{\mathrm{Q}}|}{\rho \ddot{X}_g
 H^2}$','interpreter','latex','fontsize',20);
set(y, 'Units', 'Normalized', 'Position', [-0.105, 0.5, 0]);
hYLabel = get(gca,'YLabel');
set(hYLabel,'rotation',0,'VerticalAlignment','middle')

hh=legend('Exact');
set(hh,'fontsize',20)
set(hh,'Location','northeast')
%set(hh,'FontAngle','italic')
legend boxoff

title('\it a) \delta_d = 5 %')
ax=gca;
ax.Title.FontSize = 12;
%%%%%%%%%%%%%%
DE=0.1;
Q_DE010_NU010=zeros(size(RR));
for ii=1:length(RR)
    Q_DE010_NU010(ii)=...
        integral(@(k)Q_int(k,RR(ii),DE,NU)*2/sqrt(2*pi),0,10);
end
%%%%%%%%%%%%%%
subplot(3,1,2)

plot(RR/pi*2,abs(Q_DE010_NU010),'color',[1,0,0],'Linewidth',3.5)
axis([0 3.5 0 4])
xticks([0 0.5 1 1.5 2 2.5 3 3.5]);
yticks(0:1:10)
ax.XAxis.FontSize = 12;
ax.YAxis.FontSize = 12;
%xlabel('$\varpi/\omega_s$','interpreter','latex','fontsize',32)
y=ylabel('$\frac{|\hat{\mathrm{Q}}|}{\rho \ddot{X}_g
 H^2}$','interpreter','latex','fontsize',20);
set(y, 'Units', 'Normalized', 'Position', [-0.105, 0.5, 0]);
hYLabel = get(gca,'YLabel');
set(hYLabel,'rotation',0,'VerticalAlignment','middle')
ax=gca;
%ax.TickLabelInterpreter='latex';

title('\it b) \delta_d = 10 %')
ax=gca;
ax.Title.FontSize = 12;
%%%%%%%%%%%%%%
DE=0.2;
Q_DE020_NU010=zeros(size(RR));
for ii=1:length(RR)
```

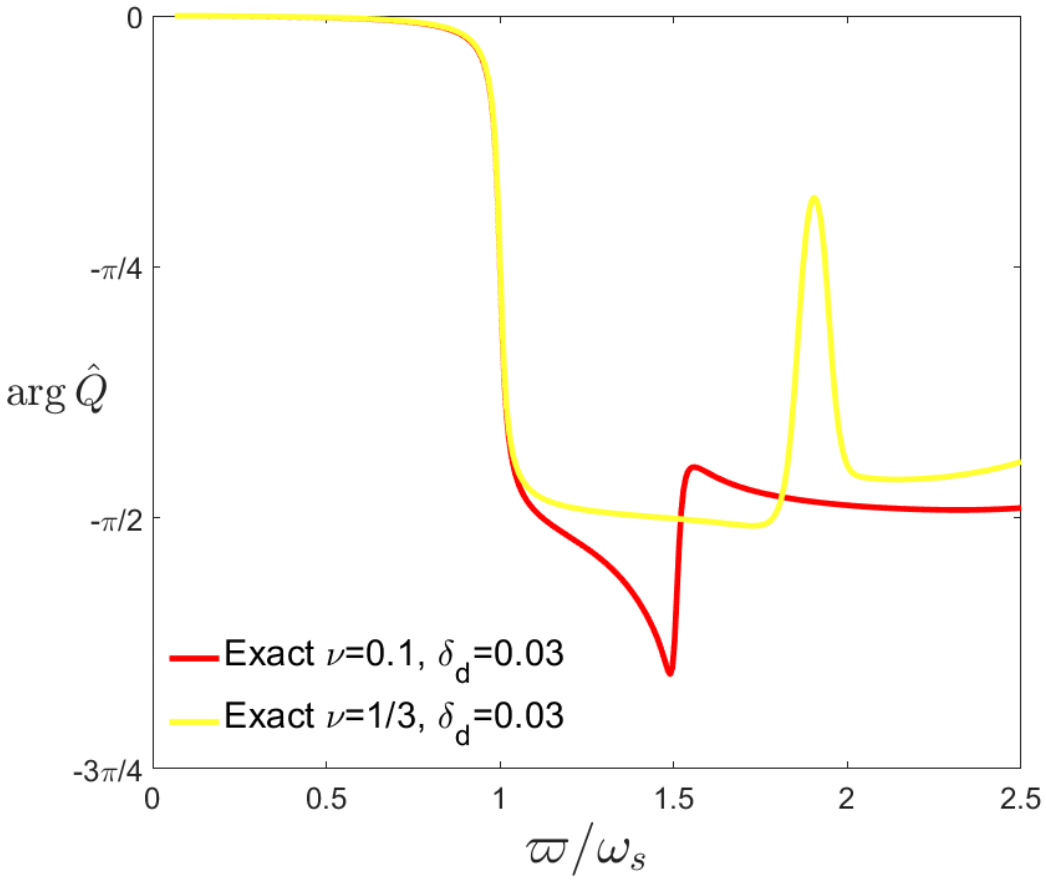
```
    Q_DE020_NU010(ii)=...
        integral(@(k)Q_int(k,RR(ii),DE,NU)*2/sqrt(2*pi),0,10);
end
%%%%%%%%%%%%%
subplot(3,1,3)

plot(RR/pi*2,abs(Q_DE020_NU010),'color',[1,0,0],'Linewidth',3.5)
axis([0 3.5 0 4])
xticks([0 0.5 1 1.5 2 2.5 3 3.5]);
yticks(0:1:10)
ax.XAxis.FontSize = 12;
ax.YAxis.FontSize = 12;
xlabel('$\varpi/\omega_s$','interpreter','latex','fontsize',32)
y=ylabel('$\frac{|\hat{\mathrm{Q}}|}{\rho \ddot{X}_g
 H^2}$','interpreter','latex','fontsize',20);
set(y, 'Units', 'Normalized', 'Position', [-0.105, 0.5, 0]);
hYLabel = get(gca,'YLabel');
set(hYLabel,'rotation',0,'VerticalAlignment','middle')
ax=gca;
%ax.TickLabelInterpreter='latex';

title('\it c) \delta_d = 20 %')
ax=gca;
ax.Title.FontSize = 12;

% Figure 13 ----------------------------------------------------
DE=0.03; NUa=0.10; NUb=1/3;
Q_DE003_NU010=zeros(size(RR));
Q_DE003_NU033=zeros(size(RR));
for ii=1:length(RR)
    Q_DE003_NU010(ii)=...
        integral(@(k)Q_int(k,RR(ii),DE,NUa)*2/sqrt(2*pi),0,10);
    Q_DE003_NU033(ii)=...
        integral(@(k)Q_int(k,RR(ii),DE,NUb)*2/sqrt(2*pi),0,10);
end

FigHandle=figure(13);
set(FigHandle,'PaperUnits','centimeters');
set(FigHandle,'Resize','off');
set(FigHandle,'PaperPositionMode','manual');
set(FigHandle,'PaperPosition',[0 0 9 6]);
set(FigHandle,'PaperSize',[9 6]); %columnwidth = 9cm
set(FigHandle, 'Position', [50, 100, 900, 750])
set(FigHandle,'defaultAxesFontName', 'Times-Roman')
set(FigHandle,'defaultTextFontName', 'Times-Roman')
set(gcf,'color','w');
plot(RR/pi*2,angle(Q_DE003_NU010),'color',[1,0,0],'Linewidth',3.5)
hold on
plot(RR/pi*2,angle(Q_DE003_NU033),'color',[1,1,0.2],'Linewidth',3.5)
axis([0 2.5 -3*pi/4 0])
ax=gca;
ax.XAxis.FontSize = 18;
ax.YAxis.FontSize = 18;
yticks([-3*pi/4,-pi/2,-pi/4,0])
```

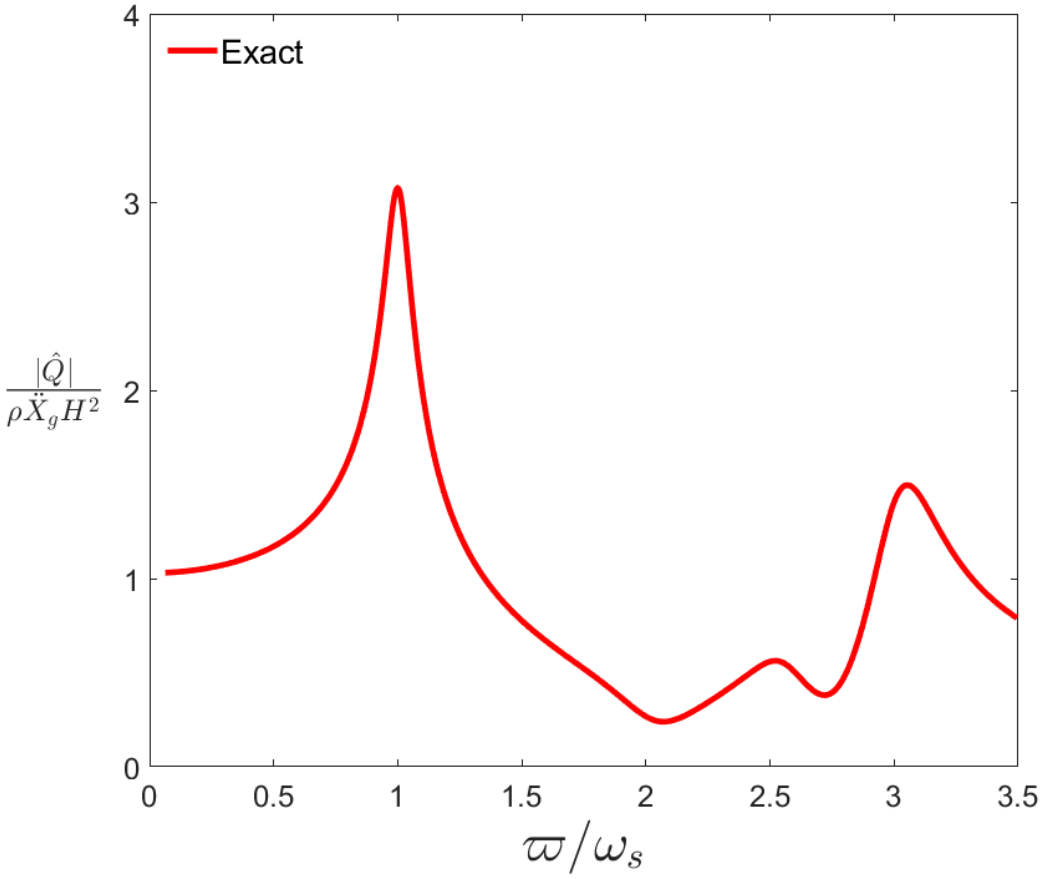
```
yticklabels({'-3\pi/4','-\pi/2','-\pi/4','0'})
xticks(0:1/2:2.5);
xlabel('$\varpi/\omega_s$','interpreter','latex','fontsize',32)
y=ylabel('$
\arg{\hat{Q}}$','interpreter','latex','fontsize',26,'FontAngle','italic');
set(y, 'Units', 'Normalized', 'Position', [-0.11, 0.5, 0]);
hYLabel = get(gca,'YLabel');
set(hYLabel,'rotation',0,'VerticalAlignment','middle')

hh=legend('Exact \nu=0.1, \delta_d=0.03','Exact \nu=1/3,
 \delta_d=0.03');
set(hh,'fontsize',22)
set(hh,'Location','southwest')
legend boxoff

% Figure 14 ----------------------------------------------
DE=0.1; NU=7/16;
Q_DE010_NU716=zeros(size(RR));
for ii=1:length(RR)
    Q_DE010_NU716(ii)=...
        integral(@(k)Q_int(k,RR(ii),DE,NU)*2/sqrt(2*pi),0,10);
end
FigHandle=figure(14);
set(FigHandle,'PaperUnits','centimeters');
set(FigHandle,'Resize','off');
set(FigHandle,'PaperPositionMode','manual');
set(FigHandle,'PaperPosition',[0 0 9 6]);
set(FigHandle,'PaperSize',[9 6]); %columnwidth = 9cm
set(FigHandle, 'Position', [50, 100, 900, 750])
set(FigHandle,'defaultAxesFontName', 'Times-Roman')
set(FigHandle,'defaultTextFontName', 'Times-Roman')
set(gcf,'color','w');
plot(RR/pi*2,abs(Q_DE010_NU716),'color',[1,0,0],'Linewidth',3.5)
axis([0 3.5 0 4])
ax=gca;
ax.XAxis.FontSize = 18;
ax.YAxis.FontSize = 18;
xticks(0:0.5:3.5)
yticks(0:10);
xlabel('$\varpi/\omega_s$','interpreter','latex','fontsize',32)
y=ylabel('$\frac{|\hat{Q}|}{\rho \ddot{X}_g
 H^2}$','interpreter','latex','fontsize',26,'FontAngle','italic');
set(y, 'Units', 'Normalized', 'Position', [-0.11, 0.5, 0]);
hYLabel = get(gca,'YLabel');
set(hYLabel,'rotation',0,'VerticalAlignment','middle')

hh=legend('Exact');
set(hh,'fontsize',20)
set(hh,'Location','northwest')
legend boxoff

% Figure 15 ----------------------------------------------
DE=0.1; NUa=0.42; NUb=0.45;
Q_DE010_NU042=zeros(size(RR));
```

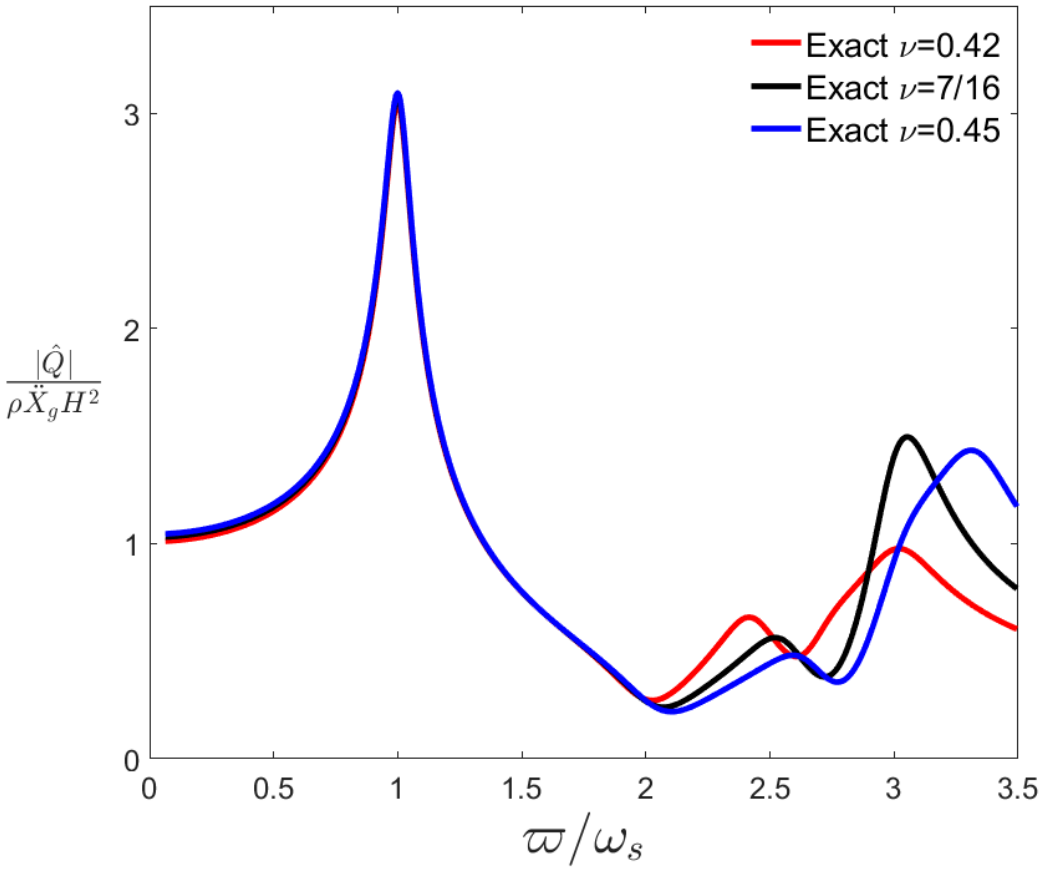
```
Q_DE010_NU045=zeros(size(RR));
for ii=1:length(RR)
    Q_DE010_NU042(ii)=...
        integral(@(k)Q_int(k,RR(ii),DE,NUa)*2/sqrt(2*pi),0,10);
    Q_DE010_NU045(ii)=...
        integral(@(k)Q_int(k,RR(ii),DE,NUb)*2/sqrt(2*pi),0,10);
end
FigHandle=figure(15);
set(FigHandle,'PaperUnits','centimeters');
set(FigHandle,'Resize','off');
set(FigHandle,'PaperPositionMode','manual');
set(FigHandle,'PaperPosition',[0 0 9 6]);
set(FigHandle,'PaperSize',[9 6]); %columnwidth = 9cm
set(FigHandle, 'Position', [50, 100, 900, 750])
set(FigHandle,'defaultAxesFontName', 'Times-Roman')
set(FigHandle,'defaultTextFontName', 'Times-Roman')
set(gcf,'color','w');
plot(RR/pi*2,abs(Q_DE010_NU042),'color',[1,0,0],'Linewidth',3.5)
hold on
plot(RR/pi*2,abs(Q_DE010_NU716),'color',[0,0,0],'Linewidth',3.5)
hold on
plot(RR/pi*2,abs(Q_DE010_NU045),'color',[0,0,1],'Linewidth',3.5)
axis([0 3.5 0 3.5])
ax=gca;
ax.XAxis.FontSize = 18;
ax.YAxis.FontSize = 18;
xticks(0:0.5:3.5)
yticks(0:10);
xlabel('$\varpi/\omega_s$','interpreter','latex','fontsize',32)
y=ylabel('$\frac{|\hat{Q}|}{\rho \ddot{X}_g
 H^2}$','interpreter','latex','fontsize',26,'FontAngle','italic');
set(y, 'Units', 'Normalized', 'Position', [-0.11, 0.5, 0]);
hYLabel = get(gca,'YLabel');
set(hYLabel,'rotation',0,'VerticalAlignment','middle')

hh=legend('Exact \nu=0.42','Exact \nu=7/16','Exact \nu=0.45');
set(hh,'fontsize',20)
set(hh,'Location','northeast')
legend boxoff
```


Exact
10
9
8
7
6
5
4
3
2
1
0
0
0.5
1
1.5
2
2.5
3
3.5
$\frac{|\hat{Q}|}{\rho \ddot{X}_g H^2}$
ϖ/ω_s


a) δ_d = 5 %
Exact
b) δ_d = 10 %
c) δ_d = 20 %
$\frac{|\hat{Q}|}{\rho \ddot{X}_g H^2}$
0
1
2
3
4
0.5
1.5
2.5
3.5
ϖ / ω_S


0
-π/4
-π/2
-3π/4
arg $\hat{Q}$
0
0.5
1
1.5
2
2.5
ϖ/ω_s
Exact ν=0.1, δ_d=0.03
Exact ν=1/3, δ_d=0.03


Exact
$\frac{|\hat{Q}|}{\rho \ddot{X}_g H^2}$
ϖ/ω_s
0
0.5
1
1.5
2
2.5
3
3.5
0
1
2
3
4



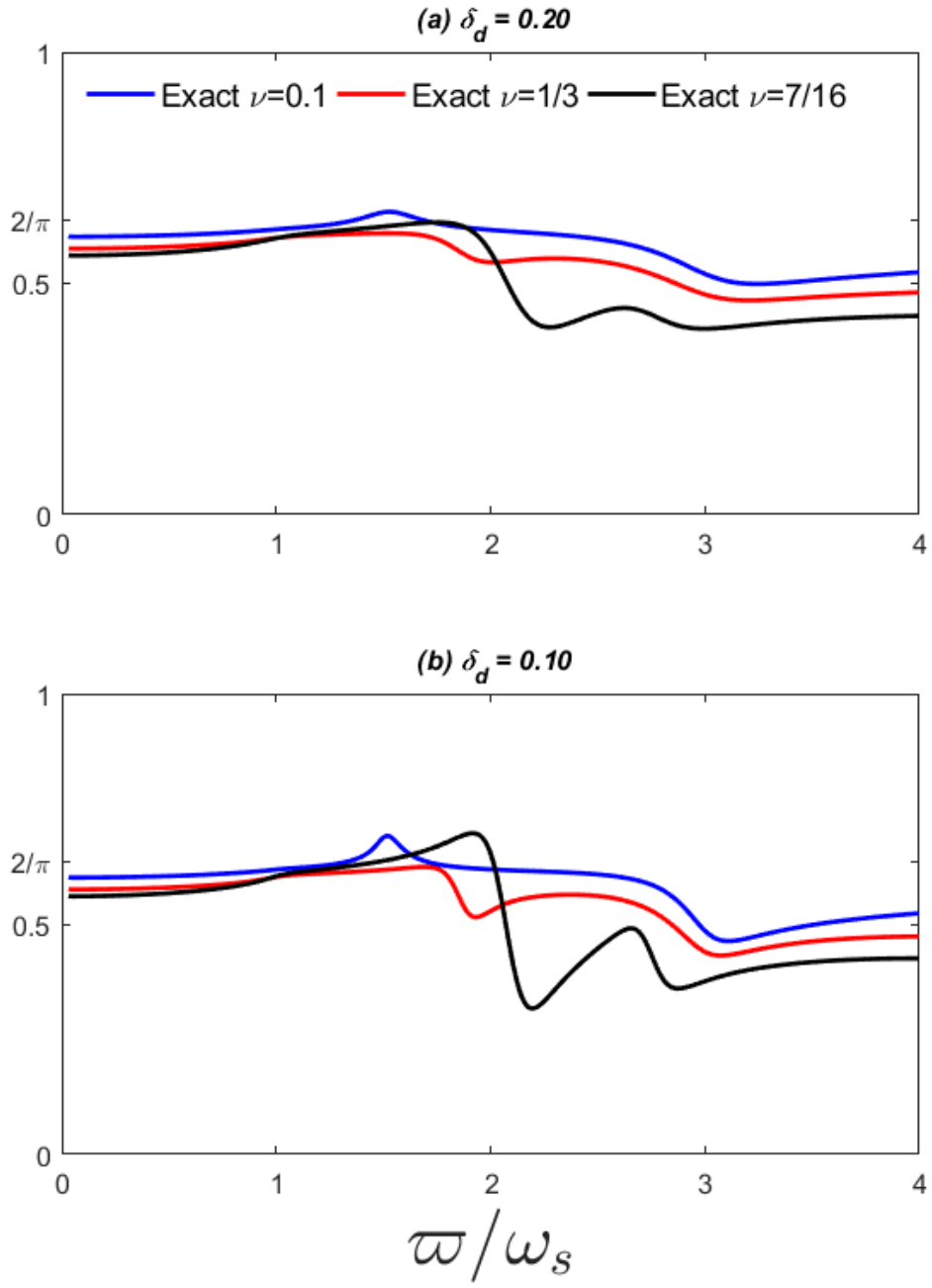
Figures involving the Eccentricity

Generation of this figure is slow, may take up to 10 minutes depending on machine.

```
DE=0.1; NUa=0.10; NUb=1/3; NUc=7/16;
ecc_DE010_NU010=zeros(size(RR));
ecc_DE010_NU033=zeros(size(RR));
ecc_DE010_NU044=zeros(size(RR));
RR=(5:400*pi/2)/100;

for ii=1:length(RR)
    ecc_DE010_NU010(ii)=...
        abs(integral(@(k)Q_int(k,RR(ii),DE,NUa)*2/sqrt(2*pi),0,10)...
        -integral(@(k)intq1_int(k,RR(ii),DE,NUa)*2/
sqrt(2*pi),0,10))...
        /abs(integral(@(k)Q_int(k,RR(ii),DE,NUa)*2/sqrt(2*pi),0,10));
    ecc_DE010_NU033(ii)=...
        abs(integral(@(k)Q_int(k,RR(ii),DE,NUb)*2/sqrt(2*pi),0,10)...
        -integral(@(k)intq1_int(k,RR(ii),DE,NUb)*2/
sqrt(2*pi),0,10))...
        /abs(integral(@(k)Q_int(k,RR(ii),DE,NUb)*2/sqrt(2*pi),0,10));
    ecc_DE010_NU044(ii)=...
        abs(integral(@(k)Q_int(k,RR(ii),DE,NUc)*2/sqrt(2*pi),0,10)...
```

```
        -integral(@(k)intq1_int(k,RR(ii),DE,NUc)*2/
sqrt(2*pi),0,10))...
        /abs(integral(@(k)Q_int(k,RR(ii),DE,NUc)*2/sqrt(2*pi),0,10));
end

DE=0.2;
ecc_DE020_NU010=zeros(size(RR));
ecc_DE020_NU033=zeros(size(RR));
ecc_DE020_NU044=zeros(size(RR));

for ii=1:length(RR)
    ecc_DE020_NU010(ii)=...
        abs(integral(@(k)Q_int(k,RR(ii),DE,NUa)*2/sqrt(2*pi),0,10)...
        -integral(@(k)intq1_int(k,RR(ii),DE,NUa)*2/
sqrt(2*pi),0,10))...
        /abs(integral(@(k)Q_int(k,RR(ii),DE,NUa)*2/sqrt(2*pi),0,10));
    ecc_DE020_NU033(ii)=...
        abs(integral(@(k)Q_int(k,RR(ii),DE,NUb)*2/sqrt(2*pi),0,10)...
        -integral(@(k)intq1_int(k,RR(ii),DE,NUb)*2/
sqrt(2*pi),0,10))...
        /abs(integral(@(k)Q_int(k,RR(ii),DE,NUb)*2/sqrt(2*pi),0,10));
    ecc_DE020_NU044(ii)=...
        abs(integral(@(k)Q_int(k,RR(ii),DE,NUc)*2/sqrt(2*pi),0,10)...
        -integral(@(k)intq1_int(k,RR(ii),DE,NUc)*2/
sqrt(2*pi),0,10))...
        /abs(integral(@(k)Q_int(k,RR(ii),DE,NUc)*2/sqrt(2*pi),0,10));
end

FigHandle=figure(16);
set(FigHandle,'PaperUnits','centimeters');
set(FigHandle,'Resize','off');
set(FigHandle,'PaperPositionMode','manual');
set(FigHandle,'PaperPosition',[0 0 9 6]);
set(FigHandle,'PaperSize',[9 6]); %columnwidth = 9cm
set(FigHandle, 'Position', [0, 0, 650, 1200])
set(FigHandle,'defaultAxesFontName', 'Times-Roman')
set(FigHandle,'defaultTextFontName', 'Times-Roman')
set(gcf,'color','w');
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
subplot(2,1,1)
plot(RR*2/pi,ecc_DE020_NU010,'color',[0,0,1],'Linewidth',2.)
hold on
plot(RR*2/pi,ecc_DE020_NU033,'color',[1,0,0],'Linewidth',2.)
hold on
plot(RR*2/pi,ecc_DE020_NU044,'color',[0,0,0],'Linewidth',2.)
axis([0 4 0 1])
xticks(0:4)
yticks([0 0.5 2/pi 1])
yticklabels({'0','0.5','2/\pi','1'})
ax=gca;
ax.XAxis.FontSize = 12;
ax.YAxis.FontSize = 12;
```

```
hh=legend('Exact \nu=0.1','Exact \nu=1/3','Exact \nu=7/16');
set(hh,'fontsize',14)
set(hh,'Location','northwest')
set(hh,'Orientation','horizontal')
legend boxoff

title('\it (a) \delta_d = 0.20')
ax=gca;
ax.Title.FontSize = 12;
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
subplot(2,1,2)
plot(RR*2/pi,ecc_DE010_NU010,'color',[0,0,1],'Linewidth',2.)
hold on
plot(RR*2/pi,ecc_DE010_NU033,'color',[1,0,0],'Linewidth',2.)
hold on
plot(RR*2/pi,ecc_DE010_NU044,'color',[0,0,0],'Linewidth',2.)
axis([0 4 0 1])
xticks(0:4)
yticks([0 0.5 2/pi 1])
yticklabels({'0','0.5','2/\pi','1'})
ax=gca;
ax.XAxis.FontSize = 12;
ax.YAxis.FontSize = 12;
xlabel('$\varpi/\omega_s$','interpreter','latex','fontsize',32)

title('\it (b) \delta_d = 0.10')
ax=gca;
ax.Title.FontSize = 12;
```



Figures involving the Stress distribution along the wall

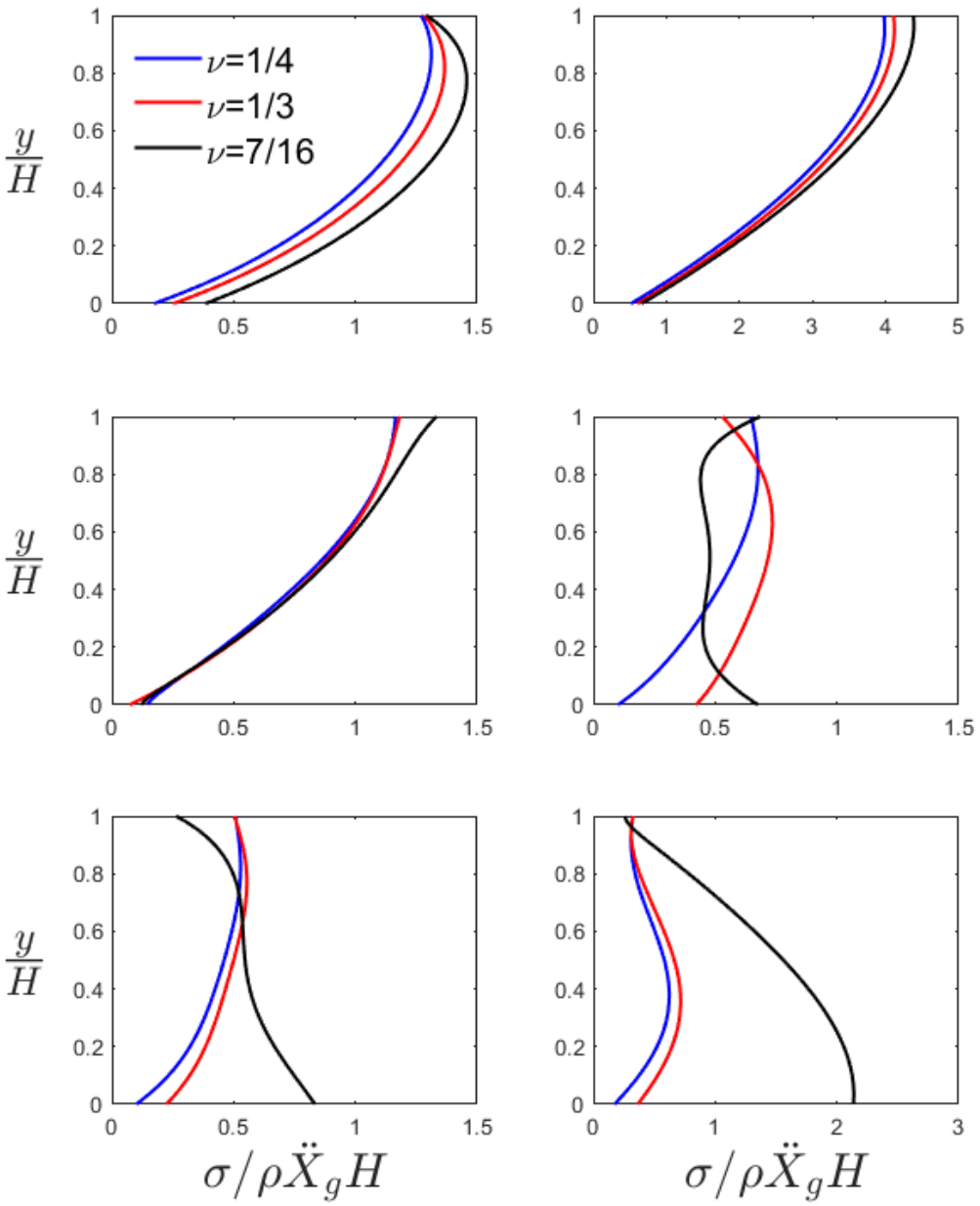
```
% Figure 17
 ---------------------------------------------------------------
FigHandle=figure(17);
set(FigHandle,'PaperUnits','centimeters');
set(FigHandle,'Resize','off');
```

```
set(FigHandle,'PaperPositionMode','manual');
set(FigHandle,'PaperPosition',[0 0 9 6]);
set(FigHandle,'PaperSize',[9 6]); %columnwidth = 9cm
set(FigHandle, 'Position', [0, 0, 650, 1200])
set(FigHandle,'defaultAxesFontName', 'Times-Roman')
set(FigHandle,'defaultTextFontName', 'Times-Roman')
set(gcf,'color','w');
%%%%%%%%%%%%%%
subplot(3,2,1)
%%%%%%%%%%%%%%
DE=0.1; RR=pi/4; NUa=1/4; NUb=1/3; NUc=7/16;
Ys=(0:100)/100;
sigma_DE010_NU025=zeros(size(Ys));
sigma_DE010_NU033=zeros(size(Ys));
sigma_DE010_NU044=zeros(size(Ys));
for ii=1:length(Ys)
    sigma_DE010_NU025(ii)=...
        integral(@(k)sigma_int(Ys(ii),k,RR,DE,NUa)*2/sqrt(2*pi),0,10);
    sigma_DE010_NU033(ii)=...
        integral(@(k)sigma_int(Ys(ii),k,RR,DE,NUb)*2/sqrt(2*pi),0,10);
    sigma_DE010_NU044(ii)=...
        integral(@(k)sigma_int(Ys(ii),k,RR,DE,NUc)*2/sqrt(2*pi),0,10);
end
%%%%%%%%%%%%%%
plot(abs(sigma_DE010_NU025),Ys,'color',[0,0,1],'Linewidth',1.5)
hold on
plot(abs(sigma_DE010_NU033),Ys,'color',[1,0,0],'Linewidth',1.5)
hold on
plot(abs(sigma_DE010_NU044),Ys,'color',[0,0,0],'Linewidth',1.5)

%xlabel('$\sigma/\rho \gamma H$','interpreter','latex','fontsize',32)
y=ylabel('$\frac{y}
{H}$','interpreter','latex','fontsize',26,'FontAngle','italic');
set(y, 'Units', 'Normalized', 'Position', [-0.24, 0.5, 0]);
hYLabel = get(gca,'YLabel');
set(hYLabel,'rotation',0,'VerticalAlignment','middle')

hh=legend('\nu=1/4','\nu=1/3','\nu=7/16');
set(hh,'fontsize',16)
set(hh,'Location','northwest')
legend boxoff
%%%%%%%%%%%%%%
subplot(3,2,2)
%%%%%%%%%%%%%%
RR=pi/2;
sigma_DE010_NU025=zeros(size(Ys));
sigma_DE010_NU033=zeros(size(Ys));
sigma_DE010_NU044=zeros(size(Ys));
for ii=1:length(Ys)
    sigma_DE010_NU025(ii)=...
        integral(@(k)sigma_int(Ys(ii),k,RR,DE,NUa)*2/sqrt(2*pi),0,10);
    sigma_DE010_NU033(ii)=...
        integral(@(k)sigma_int(Ys(ii),k,RR,DE,NUb)*2/sqrt(2*pi),0,10);
    sigma_DE010_NU044(ii)=...
```

```
        integral(@(k)sigma_int(Ys(ii),k,RR,DE,NUc)*2/sqrt(2*pi),0,10);
end
%%%%%%%%%%%%%
plot(abs(sigma_DE010_NU025),Ys,'color',[0,0,1],'Linewidth',1.5)
hold on
plot(abs(sigma_DE010_NU033),Ys,'color',[1,0,0],'Linewidth',1.5)
hold on
plot(abs(sigma_DE010_NU044),Ys,'color',[0,0,0],'Linewidth',1.5)
%%%%%%%%%%%%%
subplot(3,2,3)
%%%%%%%%%%%%%
DE=0.1; RR=3*pi/4;
sigma_DE010_NU025=zeros(size(Ys));
sigma_DE010_NU033=zeros(size(Ys));
sigma_DE010_NU044=zeros(size(Ys));
for ii=1:length(Ys)
    sigma_DE010_NU025(ii)=...
        integral(@(k)sigma_int(Ys(ii),k,RR,DE,NUa)*2/sqrt(2*pi),0,10);
    sigma_DE010_NU033(ii)=...
        integral(@(k)sigma_int(Ys(ii),k,RR,DE,NUb)*2/sqrt(2*pi),0,10);
    sigma_DE010_NU044(ii)=...
        integral(@(k)sigma_int(Ys(ii),k,RR,DE,NUc)*2/sqrt(2*pi),0,10);
end
%%%%%%%%%%%%%
plot(abs(sigma_DE010_NU025),Ys,'color',[0,0,1],'Linewidth',1.5)
hold on
plot(abs(sigma_DE010_NU033),Ys,'color',[1,0,0],'Linewidth',1.5)
hold on
plot(abs(sigma_DE010_NU044),Ys,'color',[0,0,0],'Linewidth',1.5)

%xlabel('$\sigma/\rho \gamma H$','interpreter','latex','fontsize',32)
y=ylabel('$\frac{y}
{H}$','interpreter','latex','fontsize',26,'FontAngle','italic');
set(y, 'Units', 'Normalized', 'Position', [-0.24, 0.5, 0]);
hYLabel = get(gca,'YLabel');
set(hYLabel,'rotation',0,'VerticalAlignment','middle')

%%%%%%%%%%%%%
subplot(3,2,4)
%%%%%%%%%%%%%
RR=pi;
sigma_DE010_NU025=zeros(size(Ys));
sigma_DE010_NU033=zeros(size(Ys));
sigma_DE010_NU044=zeros(size(Ys));
for ii=1:length(Ys)
    sigma_DE010_NU025(ii)=...
        integral(@(k)sigma_int(Ys(ii),k,RR,DE,NUa)*2/sqrt(2*pi),0,10);
    sigma_DE010_NU033(ii)=...
        integral(@(k)sigma_int(Ys(ii),k,RR,DE,NUb)*2/sqrt(2*pi),0,10);
    sigma_DE010_NU044(ii)=...
        integral(@(k)sigma_int(Ys(ii),k,RR,DE,NUc)*2/sqrt(2*pi),0,10);
end
%%%%%%%%%%%%%
plot(abs(sigma_DE010_NU025),Ys,'color',[0,0,1],'Linewidth',1.5)
```

```
hold on
plot(abs(sigma_DE010_NU033),Ys,'color',[1,0,0],'Linewidth',1.5)
hold on
plot(abs(sigma_DE010_NU044),Ys,'color',[0,0,0],'Linewidth',1.5)
axis([0 1.5 0 1])
%%%%%%%%%%%%%%
subplot(3,2,5)
%%%%%%%%%%%%%%
RR=5*pi/4;
sigma_DE010_NU025=zeros(size(Ys));
sigma_DE010_NU033=zeros(size(Ys));
sigma_DE010_NU044=zeros(size(Ys));
for ii=1:length(Ys)
    sigma_DE010_NU025(ii)=...
        integral(@(k)sigma_int(Ys(ii),k,RR,DE,NUa)*2/sqrt(2*pi),0,10);
    sigma_DE010_NU033(ii)=...
        integral(@(k)sigma_int(Ys(ii),k,RR,DE,NUb)*2/sqrt(2*pi),0,10);
    sigma_DE010_NU044(ii)=...
        integral(@(k)sigma_int(Ys(ii),k,RR,DE,NUc)*2/sqrt(2*pi),0,10);
end
%%%%%%%%%%%%%%
plot(abs(sigma_DE010_NU025),Ys,'color',[0,0,1],'Linewidth',1.5)
hold on
plot(abs(sigma_DE010_NU033),Ys,'color',[1,0,0],'Linewidth',1.5)
hold on
plot(abs(sigma_DE010_NU044),Ys,'color',[0,0,0],'Linewidth',1.5)
axis([0 1.5 0 1])
xlabel('$\sigma/\rho \ddot{X}_g H
$','interpreter','latex','fontsize',22)
y=ylabel('$\frac{y}
{H}$','interpreter','latex','fontsize',26,'FontAngle','italic');
set(y, 'Units', 'Normalized', 'Position', [-0.24, 0.5, 0]);
hYLabel = get(gca,'YLabel');
set(hYLabel,'rotation',0,'VerticalAlignment','middle')

%%%%%%%%%%%%%%
subplot(3,2,6)
%%%%%%%%%%%%%%
RR=3*pi/2;
sigma_DE010_NU025=zeros(size(Ys));
sigma_DE010_NU033=zeros(size(Ys));
sigma_DE010_NU044=zeros(size(Ys));
for ii=1:length(Ys)
    sigma_DE010_NU025(ii)=...
        integral(@(k)sigma_int(Ys(ii),k,RR,DE,NUa)*2/sqrt(2*pi),0,10);
    sigma_DE010_NU033(ii)=...
        integral(@(k)sigma_int(Ys(ii),k,RR,DE,NUb)*2/sqrt(2*pi),0,10);
    sigma_DE010_NU044(ii)=...
        integral(@(k)sigma_int(Ys(ii),k,RR,DE,NUc)*2/sqrt(2*pi),0,10);
end
%%%%%%%%%%%%%%
plot(abs(sigma_DE010_NU025),Ys,'color',[0,0,1],'Linewidth',1.5)
hold on
plot(abs(sigma_DE010_NU033),Ys,'color',[1,0,0],'Linewidth',1.5)
```

```
hold on
plot(abs(sigma_DE010_NU044),Ys,'color',[0,0,0],'Linewidth',1.5)
axis([0 3 0 1])
xlabel('$\sigma/\rho \ddot{X}_g H
$','interpreter','latex','fontsize',22)
```



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