

Overdamped 2nd order system

z =
1.5000
p =
-10.4721
-1.5279

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Critically damped 2nd order system

z =
1
p =
-4
-4

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Underdamped 2nd order system

z =
0.0250
p =
-0.1000 + 3.9987i
-0.1000 - 3.9987i

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Undamped 2nd order system

z =
0
p =
0.0000 + 4.0000i
0.0000 - 4.0000i

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Negatively underdamped 2nd order system

z =
-0.0150
p =
0.0600 + 3.9995i
0.0600 - 3.9995i

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Negatively critically damped 2nd order system

z =
-1
p =
4
4

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Negatively overdamped 2nd order system

z =
-1.1500
p =
6.8716
2.3284

Stability - 2nd-order - sys. m

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1 %{
2 examples of 2nd order system stability
3 %}
4 %% initialization
5 clc
6 clear
7 format compact
8 %% initial data
9 wn=4; % natural frequency wn, rad/sec
10 %% Overdamped 2nd order system
11 display('Overdamped 2nd order system')
12 z=150e-2 % damping z%
13 A=[1 2*z*wn wn^2];
14 p=roots(A)
15 display('=====')
16 %% Critically damped 2nd order system
17 display('Critically damped 2nd order system')
18 z=100e-2 % damping z%
19 A=[1 2*z*wn wn^2];
20 p=roots(A)
21 display('=====')
22 %% Underdamped 2nd order system
23 display('Underdamped 2nd order system')
24 z=2.5e-2 % damping z%
25 A=[1 2*z*wn wn^2];
26 p=roots(A)
27 display('=====')
28 %% Undamped 2nd order system
29 display('Undamped 2nd order system')
30 z=0 % damping z%
31 A=[1 2*z*wn wn^2];
32 p=roots(A)
33 display('=====')
34 %% Negatively underdamped 2nd order system
35 display('Negatively underdamped 2nd order system')
36 z=-1.5e-2 % damping z%
37 A=[1 2*z*wn wn^2];
```

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```
38 p=roots(A)
39 display('=====)
40 %% Negatively critically damped 2nd order system
41 display('Negatively critically damped 2nd order system)
42 z=-100e-2 % damping z%
43 A=[1 2*z*wn wn^2];
44 p=roots(A)
45 display('=====)
46 %% Negatively overdamped 2nd order system
47 display('Negatively overdamped 2nd order system)
48 z=-115e-2 % damping z%
49 A=[1 2*z*wn wn^2];
50 p=roots(A)
51 display('=====)
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