Contents


```
clear
clc
```

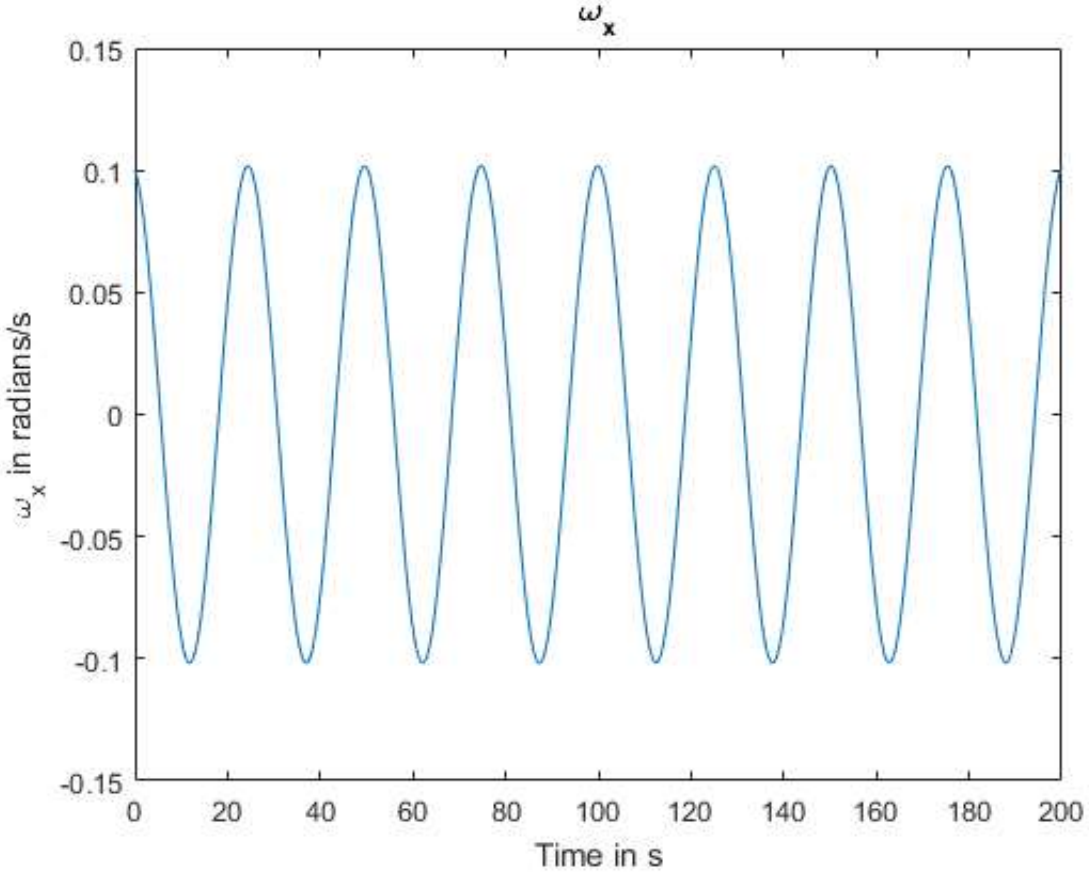
Case 1 with spin about major axis

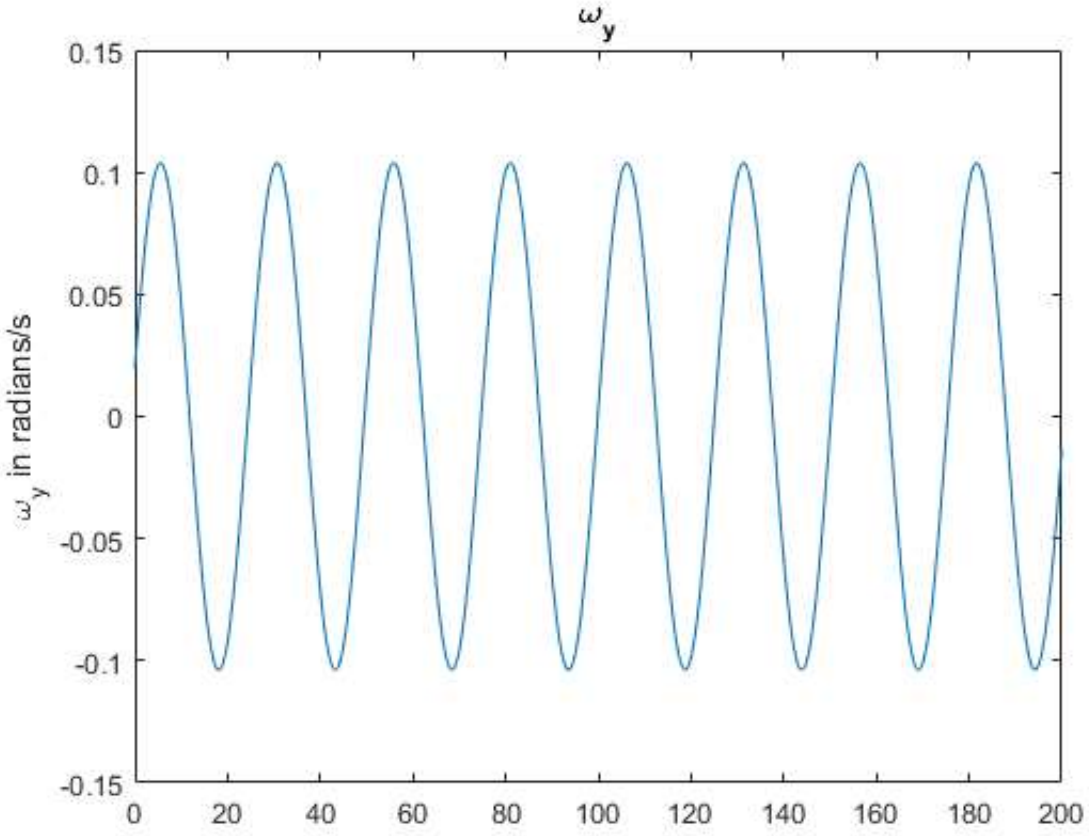
Numerically solving the ODE

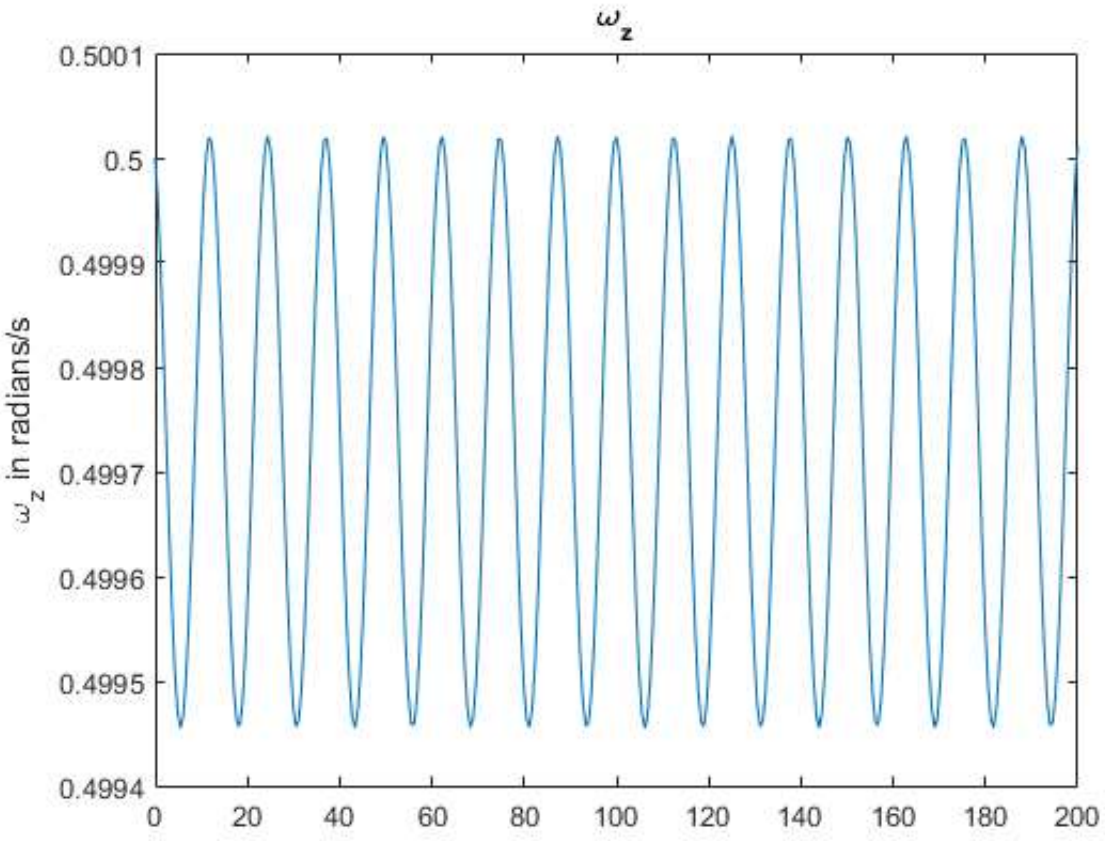
```
Ixx=98;
Iyy=102;
Izz=150;
w0              = [0.1; 0.02; 0.5] ;  % case 1 with major axis rotation
% w0              = [0.5; 0.02; 0.01];      % case 2 with minor axis rotation
tspan           = [0 200];            % [startTime endTime]
[tout, wout]    = rkf45(@wrates, tspan, w0,   0.00000001);
% [tout, wout]    = ode45(@wrates, tspan, 0.00000001);
```

Angular velocities

```
figure
plot(tout, wout(:,1))
ylabel('\omega_x in radians/s')
title('\omega_x')
xlabel('Time in s')

figure
plot(tout, wout(:,2))
ylabel('\omega_y in radians/s')
title('\omega_y')

figure
plot(tout, wout(:,3))
ylabel('\omega_z in radians/s')
title('\omega_z')
```

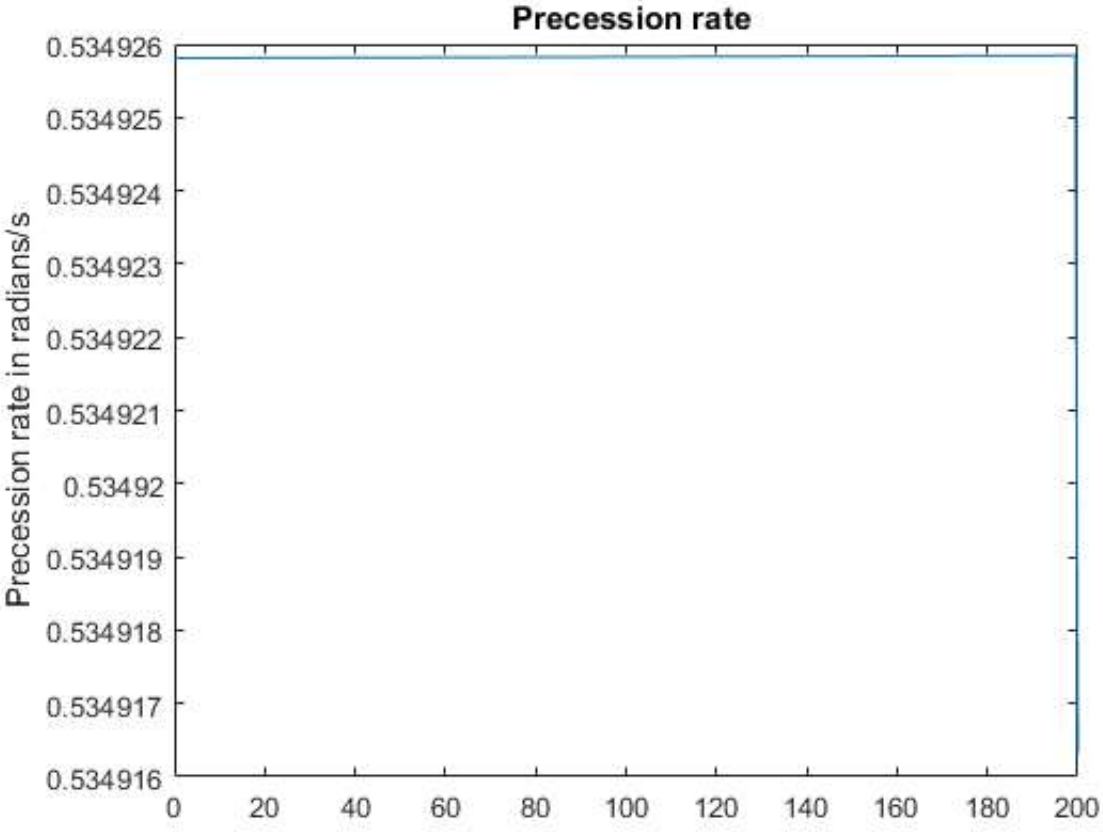

ω_x
0.15
0.1
0.05
0
-0.05
-0.1
-0.15
ω_x in radians/s
0
20
40
60
80
100
120
140
160
180
200
Time in s


ω_y
0.15
0.1
0.05
0
-0.05
-0.1
-0.15
ω_y in radians/s
0
20
40
60
80
100
120
140
160
180
200



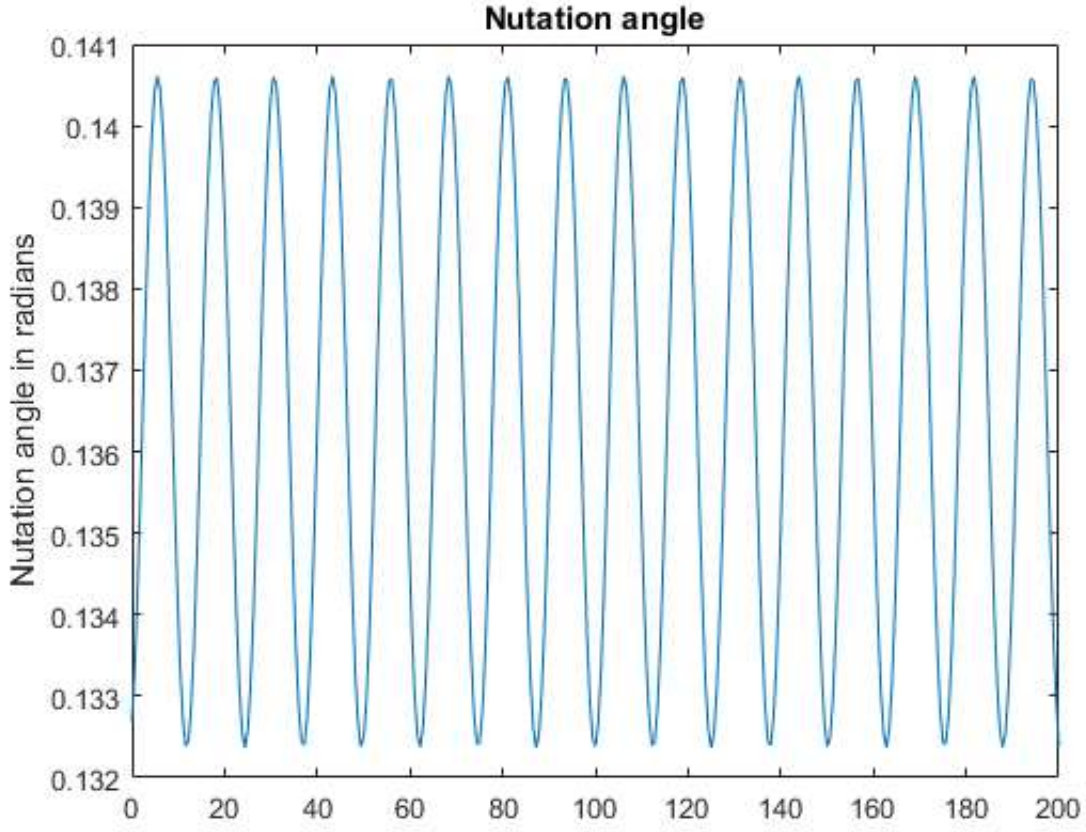
Precession rate

```
H=diag([Ixx Iyy Izz])*wout';   % Angular momentum
for i=1:max(size(H))
h(i)=norm(H(:,i));              % magnitudes or angular momentum
end
thetaDot= h/sqrt(Ixx^2+Iyy^2);    % case 1 precession rate
% thetaDot= h/sqrt(Iyy^2+Izz^2);      % case 2 precession rate

figure
plot(tout, thetaDot)
ylabel('Precession rate in radians/s')
title(' Precession rate')
```



Nutation angle

```
gamma=acos(H(3,:)./h);              % case 1 nutation angle
% gamma=acos(H(1,:)./h);                % case 2 nutation angle

figure
plot(tout, gamma)
ylabel('Nutation angle in radians')
title('Nutation angle')
```



Published with MATLAB® R2016a