Contents

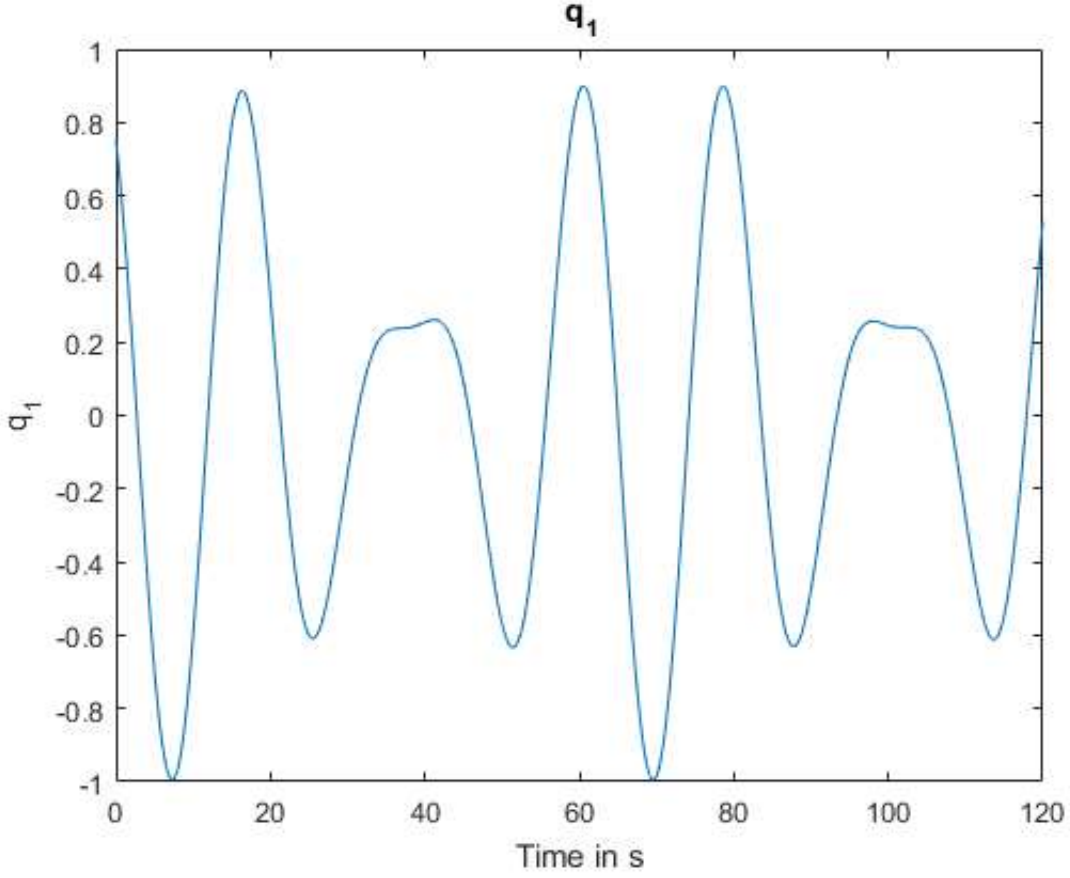

```
clear
clc
```

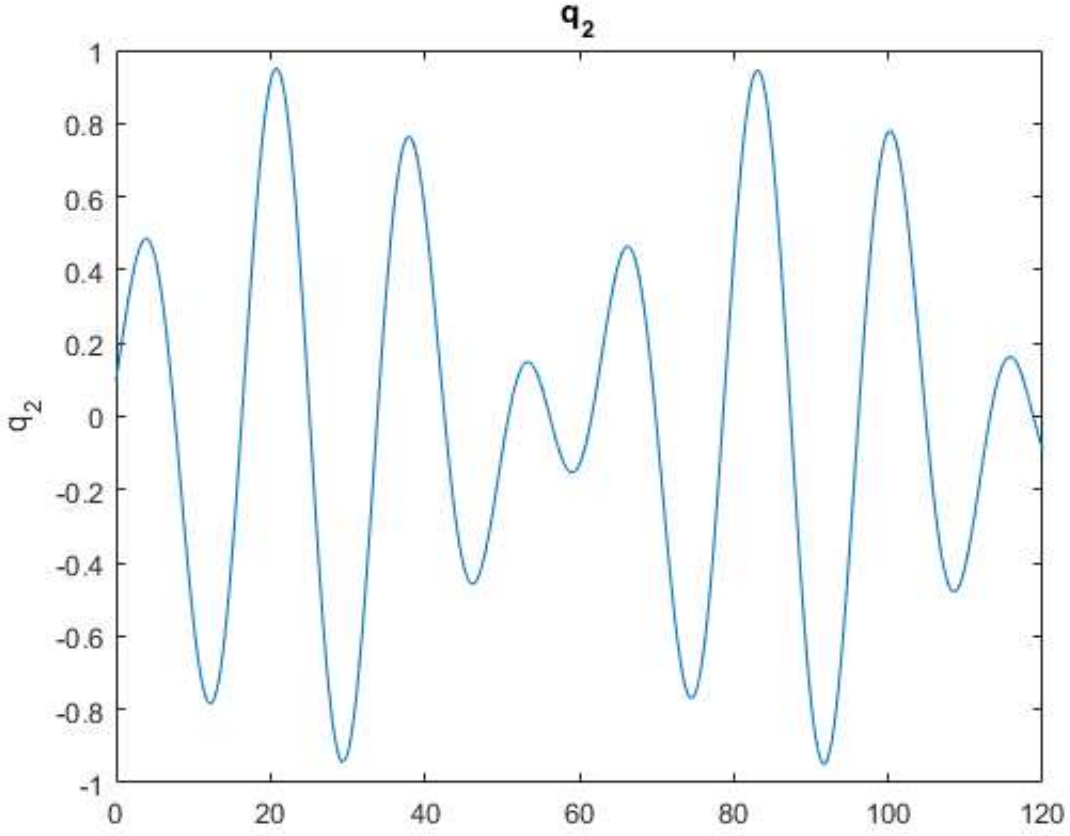
```
y0           = [80  30  40]*pi/180;  % column vector of initial euler angles phi, theta, psi
q0           = (eul2quat(y0))'       % Initial state quaternions
tspan        = [0 120];              % [startTime endTime]
[tout, qout] = rkf45(@qrates, tspan, q0, 0.00000001);    % Runge-kutta numerical integration
of quaternion rates
```

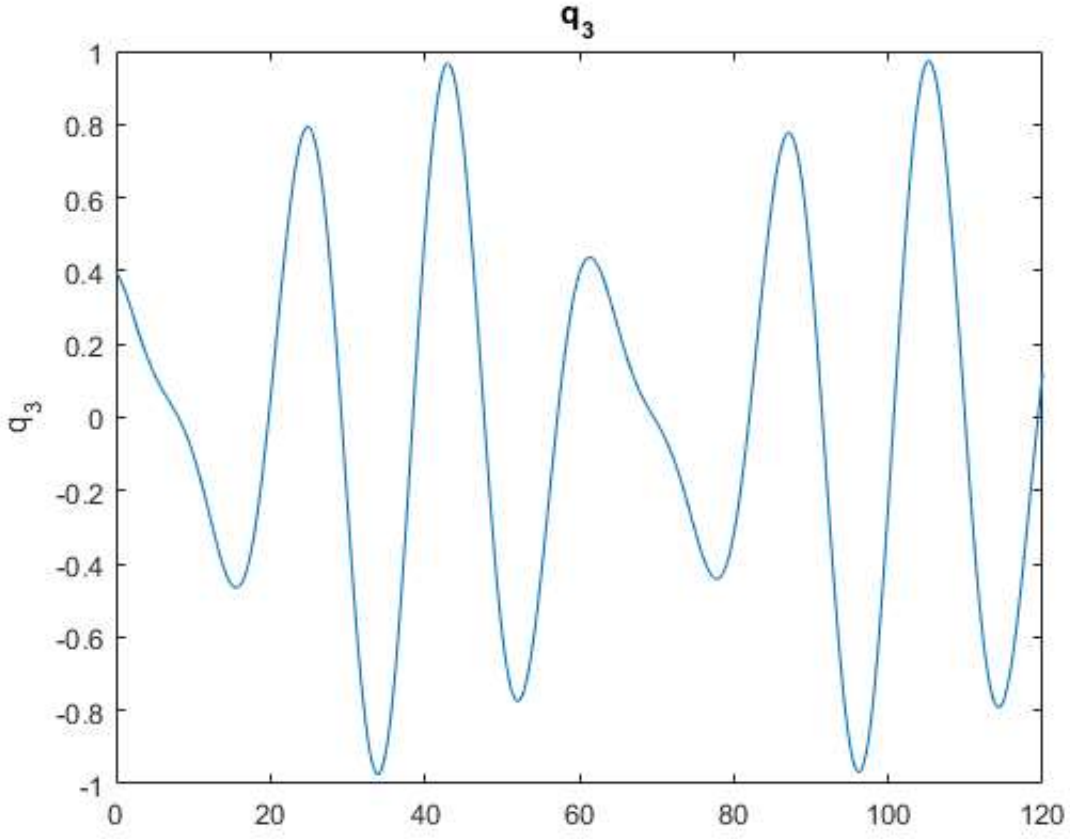
```
q0 =

    0.7522
    0.0967
    0.3987
    0.5156
```

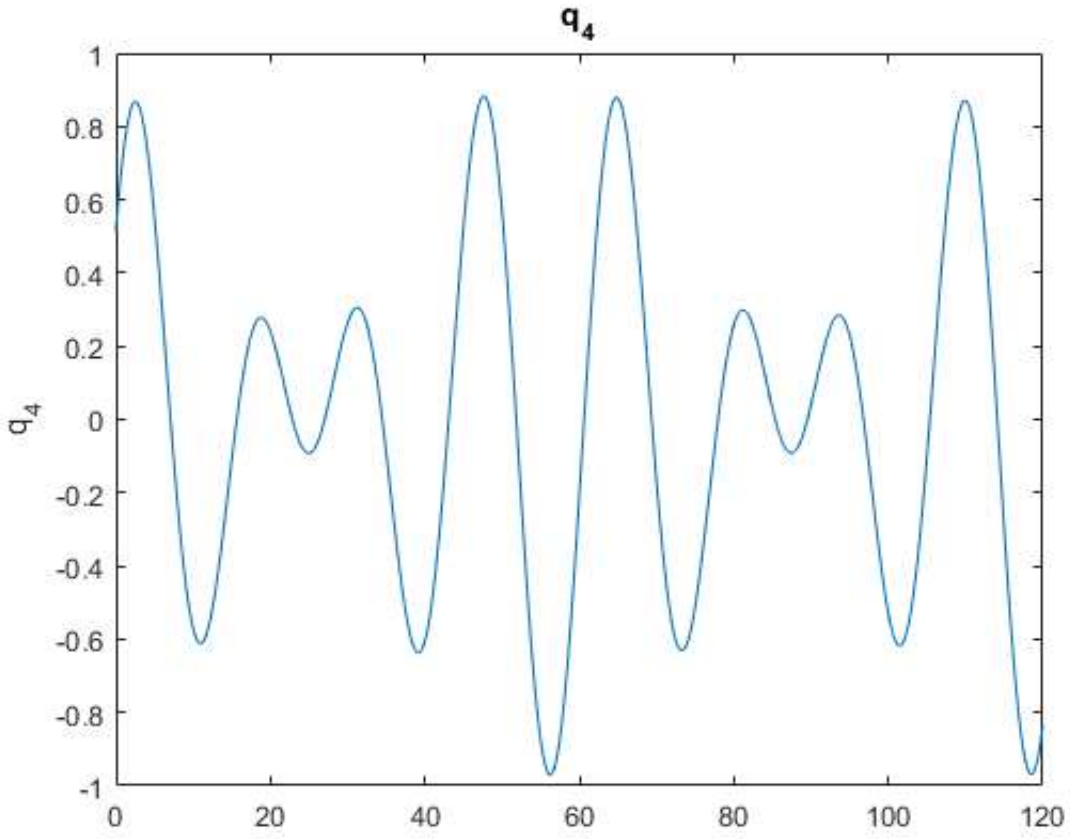
Plot Quaternion time history

```
figure
plot(tout, qout(:,1))
ylabel('q_1')
title(' q_1')
xlabel('Time in s')

figure
plot(tout, qout(:,2))
ylabel('q_2')
title('q_2')

figure
plot(tout, qout(:,3))
ylabel('q_3')
title('q_3')

figure
plot(tout, qout(:,4))
ylabel('q_4')
title('q_4')
```


q1
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
0
20
40
60
80
100
120
Time in s

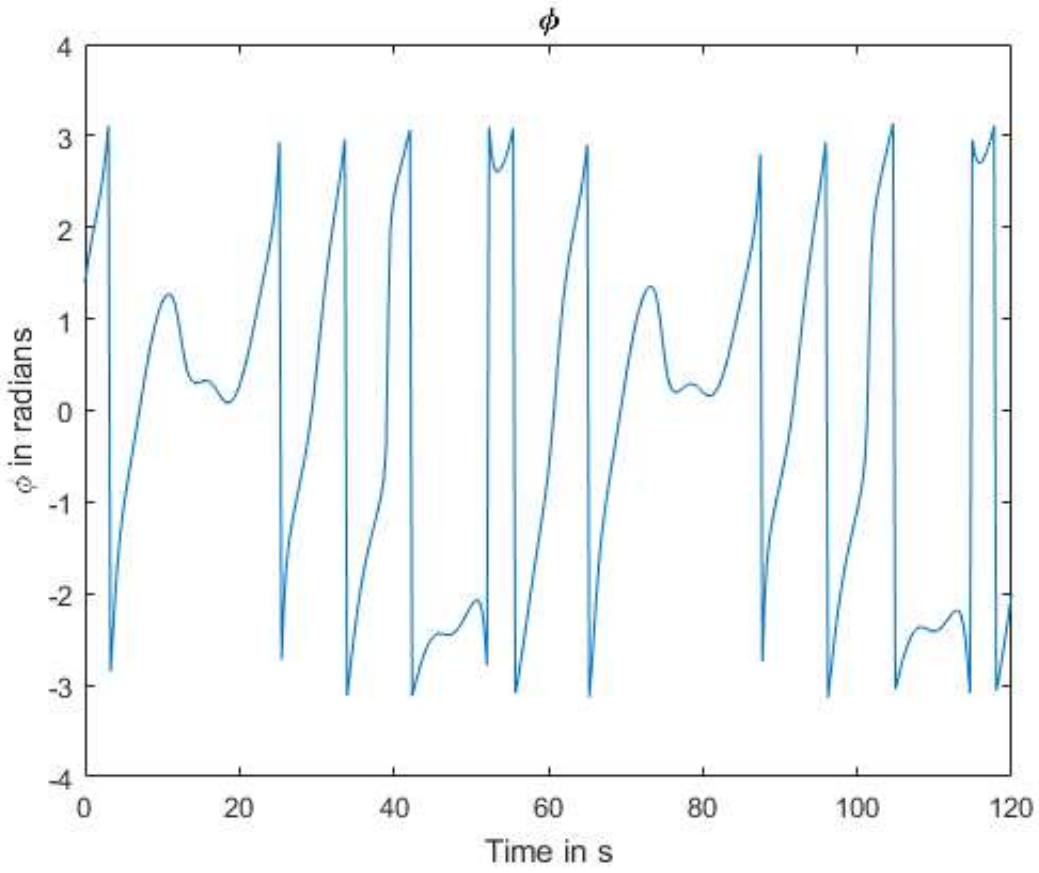

q2
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
0
20
40
60
80
100
120

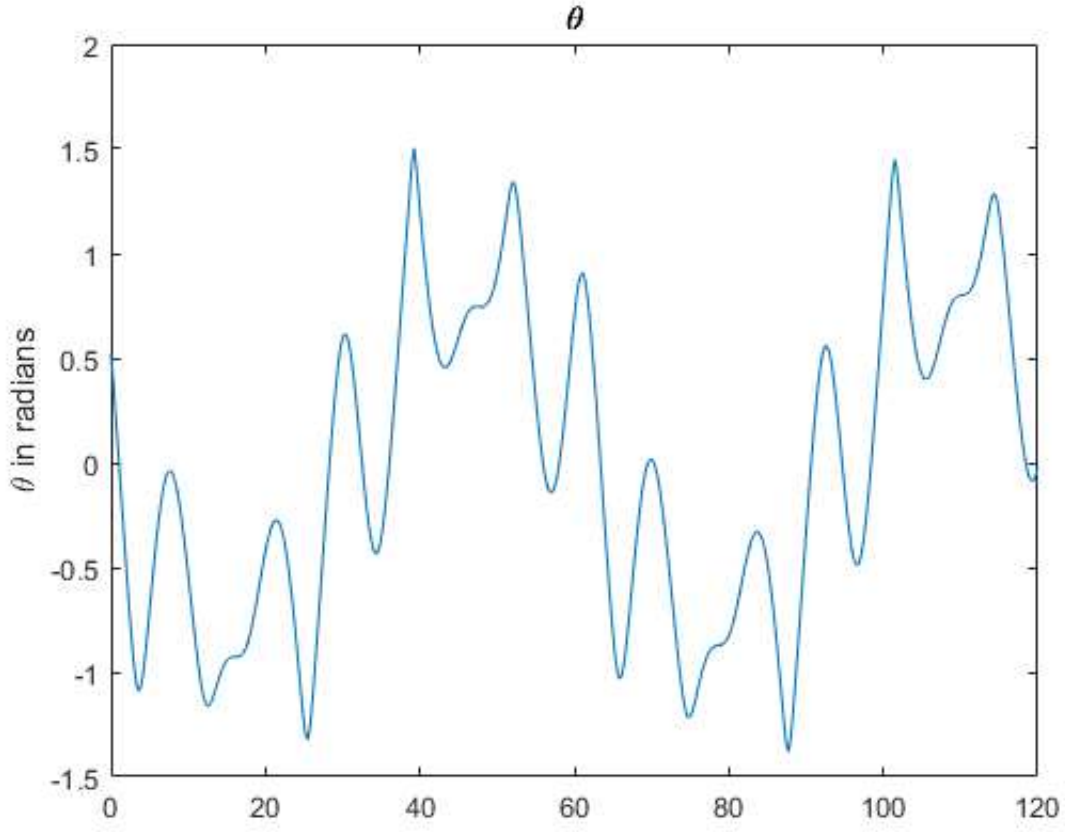


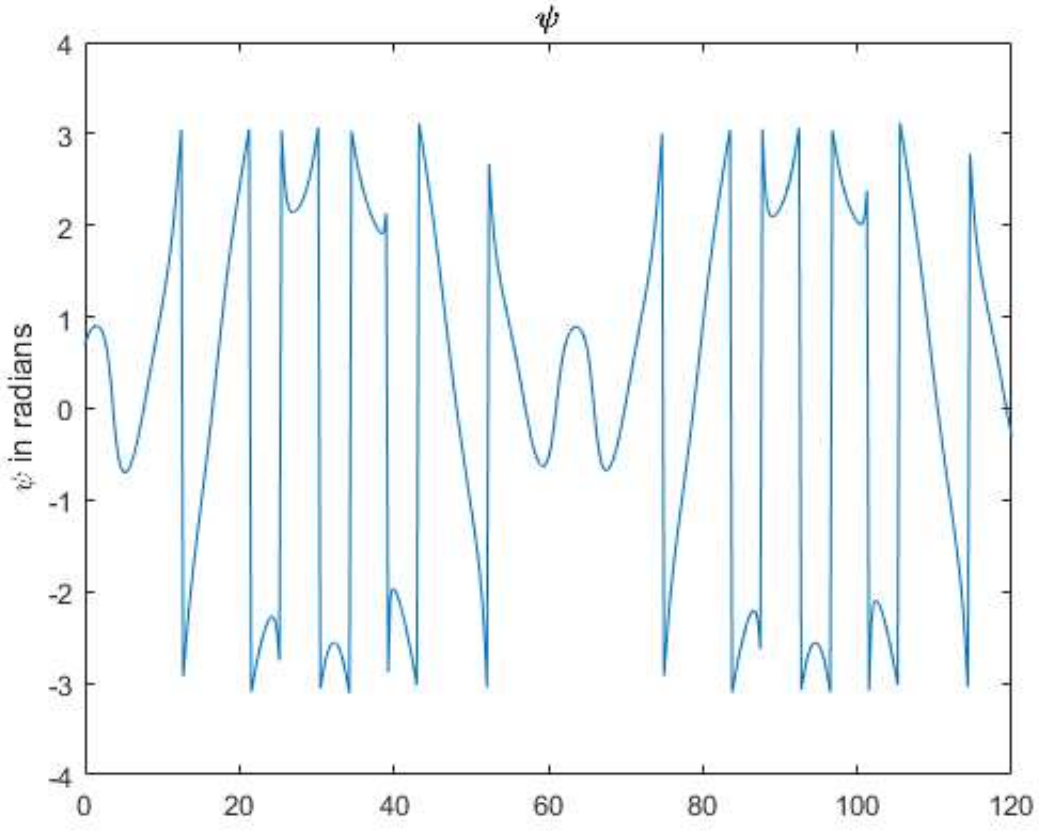


Plot Euler angles time history

```
euler=quat2eul(qout);

figure
plot(tout, euler(:,1))
ylabel('\phi in radians')
title('\phi')
xlabel('Time in s')

figure
plot(tout, euler(:,2))
ylabel('\theta in radians')
title('\theta')

figure
plot(tout, euler(:,3))
ylabel('\psi in radians')
title('\psi')
```




θ
θ in radians
2
1.5
1
0.5
0
-0.5
-1
-1.5
0
20
40
60
80
100
120


ψ
ψ in radians
4
3
2
1
0
-1
-2
-3
-4
0
20
40
60
80
100
120

Published with MATLAB® R2016a