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% AEEM6036 Assignment 2-2

% Description:

% Integrate yaw, pitch, roll angles over a simulation time of 1 minutes

% with give a initial yaw pitch and roll angles of a vehicle are (40,30,80)

% degree and the angular velocity vector of the vehicle in body frame is

% omega = 20 (sin(0.1t),0.01, cos(0.1t)) deg/s

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% Date: Sep 30, 2020

%--------------------------------------------------------------------------

%% execute integration

init\_eas = (pi/180)\*[40;30;80];

[t, eas] = Simulation(60,init\_eas);

print\_euler\_angles(t,(180/pi)\*eas)

%--------------------------------------------------------------------------

% print the euler angles in one figure

function print\_euler\_angles(t,eas)

hold on

figure(1)

title('Euler Angles');

xlabel('time (s)');

ylabel('angle (degree)');

plot(t,eas(:,1));

plot(t,eas(:,2));

plot(t,eas(:,3));

legend('psi','theta','phi');

hold off

end

% simulation with ode45 in time span [0,T] with

% an initial value of euler angles

function [t, eas] = Simulation(T,init)

[t,eas] = ode45(@EAVelocity,[0,T],init);

end

% compute the euler angle velocities with the

% angular velocity define in body frame

function dydt = EAVelocity(t,y)

omega = (pi/180)\*20\*[sin(0.1\*t);0.01;cos(0.1\*t)];

theta = y(2);

phi = y(3);

mat = [0 sin(phi) cos(phi);

0 cos(phi)\*cos(theta) -sin(phi)\*cos(theta);

cos(theta) sin(phi)\*sin(theta) cos(phi)\*sin(theta)];

dydt = (1/cos(theta))\*mat\*omega;

end

