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| --- | --- |
| function out1 = QuadrotorStateFcn11(in1,in2)  %QUADROTORSTATEFCN11  % OUT1 = QUADROTORSTATEFCN11(IN1,IN2)    % This function was generated by the Symbolic Math Toolbox version 8.7.  % 25-Feb-2022 13:16:11    phi = in1(4,:);  phidot = in1(10,:);  psidot = in1(12,:);  psi = in1(6,:);  theta = in1(5,:);  thetadot = in1(11,:);  u1 = in2(1,:);  u2 = in2(2,:);  u3 = in2(3,:);  u4 = in2(4,:);  xdot = in1(7,:);  ydot = in1(8,:);  zdot = in1(9,:);  t2 = cos(phi);  t3 = cos(psi);  t4 = cos(theta);  t5 = sin(phi);  t6 = sin(psi);  t7 = sin(theta);  t8 = phi.\*2.0;  t9 = theta.\*2.0;  t10 = thetadot.^2;  t18 = u1+u2+u3+u4;  t11 = t2.^2;  t12 = t2.^3;  t14 = t4.^2;  t15 = t4.^3;  t16 = sin(t8);  t17 = sin(t9);  t13 = t11.^2;  t19 = 1.0./t14;  et1 = u2.\*-1.15e+2+u4.\*1.15e+2-t10.\*t16.\*(2.53e+2./2.0)-t7.\*u1.\*9.2e+1+t7.\*u2.\*9.2e+1-t7.\*u3.\*9.2e+1+t7.\*u4.\*9.2e+1+t11.\*u2.\*5.5e+1-t11.\*u4.\*5.5e+1+phidot.\*t17.\*thetadot.\*(2.3e+1./2.0)+psidot.\*t4.\*thetadot.\*2.76e+2+t5.\*t10.\*t12.\*1.21e+2+t7.\*t11.\*u1.\*4.4e+1-t7.\*t11.\*u2.\*4.4e+1+t7.\*t11.\*u3.\*4.4e+1-t7.\*t11.\*u4.\*4.4e+1-t11.\*t14.\*u2.\*5.5e+1+t11.\*t14.\*u4.\*5.5e+1+psidot.\*t4.\*t11.\*thetadot.\*2.53e+2-psidot.\*t4.\*t13.\*thetadot.\*1.21e+2-psidot.\*t11.\*t15.\*thetadot.\*2.53e+2+psidot.\*t13.\*t15.\*thetadot.\*1.21e+2+t2.\*t5.\*t10.\*t14.\*2.53e+2-t5.\*t10.\*t12.\*t14.\*1.21e+2+phidot.\*t4.\*t7.\*t11.\*thetadot.\*2.53e+2-t2.\*t4.\*t5.\*t7.\*u1.\*5.5e+1+t2.\*t4.\*t5.\*t7.\*u3.\*5.5e+1;  et2 = phidot.\*psidot.\*t2.\*t5.\*t7.\*t14.\*3.85e+2;  mt1 = [xdot,ydot,zdot,phidot,thetadot,psidot,(t18.\*(t5.\*t6+t2.\*t3.\*t7))./2.0,t18.\*(t3.\*t5-t2.\*t6.\*t7).\*(-1.0./2.0),(t2.\*t4.\*t18)./2.0-9.81e+2./1.0e+2,(t19.\*(et1+et2))./5.52e+2,((t4.\*u1.\*6.0e+1-t4.\*u3.\*6.0e+1+t16.\*u1.\*2.2e+1-t16.\*u2.\*2.2e+1+t16.\*u3.\*2.2e+1-t16.\*u4.\*2.2e+1+phidot.\*psidot.\*t14.\*1.32e+2+t7.\*t10.\*t11.\*1.21e+2-t7.\*t10.\*t13.\*1.21e+2+t4.\*t11.\*u1.\*5.5e+1-t4.\*t11.\*u3.\*5.5e+1-phidot.\*psidot.\*t11.\*t14.\*3.85e+2+t2.\*t5.\*t7.\*u2.\*5.5e+1-t2.\*t5.\*t7.\*u4.\*5.5e+1+phidot.\*t2.\*t4.\*t5.\*thetadot.\*2.53e+2-psidot.\*t4.\*t5.\*t7.\*t12.\*thetadot.\*1.21e+2).\*(-1.0./5.52e+2))./t4];  mt2 = [(t19.\*(u1.\*-9.2e+1+u2.\*9.2e+1-u3.\*9.2e+1+u4.\*9.2e+1-t7.\*u2.\*1.15e+2+t7.\*u4.\*1.15e+2+t11.\*u1.\*4.4e+1-t11.\*u2.\*4.4e+1+t11.\*u3.\*4.4e+1-t11.\*u4.\*4.4e+1+phidot.\*t4.\*thetadot.\*2.3e+1+psidot.\*t17.\*thetadot.\*1.38e+2+t7.\*t11.\*u2.\*5.5e+1-t7.\*t11.\*u4.\*5.5e+1+phidot.\*t4.\*t11.\*thetadot.\*2.53e+2-t2.\*t5.\*t7.\*t10.\*2.53e+2+t5.\*t7.\*t10.\*t12.\*1.21e+2-t2.\*t4.\*t5.\*u1.\*5.5e+1+t2.\*t4.\*t5.\*u3.\*5.5e+1+phidot.\*psidot.\*t2.\*t5.\*t14.\*3.85e+2+psidot.\*t4.\*t7.\*t11.\*thetadot.\*2.53e+2-psidot.\*t4.\*t7.\*t13.\*thetadot.\*1.21e+2))./5.52e+2];  out1 = reshape([mt1,mt2],12,1); | function out1 = multirotorStateFcn(in1,in2)  %MULTIROTORSTATEFCN  % OUT1 = MULTIROTORSTATEFCN(IN1,IN2)    % This function was generated by the Symbolic Math Toolbox version 8.7.  % 25-Feb-2022 13:16:11    % x y z xdot ydot zdot zero phi theta psi phidot % thetadot psidot  x = in1(1:);  y= in1(2,:);  z = in1(3,:);  xdot = in1(4,:);  ydot = in1(5,:);  zdot = in1(6,:);  zero = in1(7,:);  phi = in1(8,:);  theta = in1(9,:);  psi = in1(10,:);  phidot = in1(11,:);  thetadot = in1(12,:);  psidot = in1(13,:);  fax = in2(1,:);  fay = in2(2,:);  faz = in2(3,:);  Ta1 = in2(4,:);  Ta2 = in2(5,:);  Ta3 = in2(6,:);  m=5;    % theta=Q(2);  % phi=Q(3);  % psi=Q(4);    Rz=[cos(psi) sin(psi) 0;-sin(psi)) cos(psi) 0;0 0 1];  Rx=[1 0 0;0 cos(theta) sin(theta);0 -sin(theta) cos(theta)];  Ry=[cos(phi) 0 sin(phi);0 1 0;-sin(phi) 0 cos(phi)];      % Rz=[cos(Q(4)) sin(Q(4)) 0;-sin(Q(4)) cos(Q(4)) 0;0 0 1];  % Rx=[1 0 0;0 cos(Q(2)) sin(Q(2));0 -sin(Q(2)) cos(Q(2))];  % Ry=[cos(Q(3)) 0 sin(Q(3));0 1 0;-sin(Q(3)) 0 cos(Q(3))];    Rs=Rz\*Rx\*Ry;  %lambda=L;  %L=0;  L=1;  Rd=[1 0 0;0 1 0;0 0 1-L];  SL=Rs\*Rd\*transpose(Rs);  %V=[Vx;Vy;Vz];  Rb=Rz;  fa=[fax;fay;faz];    g=9.8;  dF =[0;0;0.5]  fc =[0;0;0.5]  ab=(m^-1)\*((Rb\*fa)+(L\*fc)+dF)+[0;0;g];    V=[xdot; ydot; zdot];  P\_dot=SL\*V;  %rT=[rx;ry;rz];  P=[x;y;z];  Pd=[0;0;0];  rT=P-Pd;  %W=[Wx;Wy;Wz];  Q=[0; phi; theta; psi]’  W= [phidot; thetadot; psidot]  Q\_dot=(1/2)\*Q.\*[0;W];    Ixx=1;  Iyy=1;  Izz=1;  J=[Ixx 0 0;0 Iyy 0;0 0 Izz];  %ta=[tx;ty;tz];  h=J\*W;  rcom=[0;0;0];  %rcom=[0.05;0.05;0.05];  h1=transpose(Rb)\*[0;0;m\*g];  dT=[0;0;0];  %dT=[2;2;2];  h2=L\*transpose(Rb)\*fc;  ta=[Ta1; Ta2; Ta3]  W\_dot=(inv(J))\*(ta-cross(W,h)+cross(rcom,h1)+cross(rT,h2)+dT);  V\_dot=SL\*((ab)+Rb\*(cross(W\_dot,rT)+(cross(W,cross(W,rT))))); |