Priedai[1]

A priedas. Automobilio su slydimo sistema vertikaliųjų jėgų modelis

Vertikaliųjų jėgų modelyje dėl naudojamos ASS atlikti pagrindiniai judėjimo lygčių pakeitimai. Ši bendrojo 22 l. l. automobilio matematinio modelio dalis, kaip ir kitos dalys, modeliuojama programa MATLAB/Simulink.

Vertikaliųjų jėgų modelio judėjimo lygtims užrašyti naudojamas programos tekstas:

```
function dotX =
fcn(z01,v_z01,z02,v_z02,z03,v_z03,z04,v_z04,z011,v_z011,z022,v_z02
2,z033,v_z033,z044,v_z044,ax,ay,delta_z_11_22, delta_z_33_44,
z,fi,theta,z1,z2,z3,z4)

m = 1440;
g = 9.81;
Ix = 1073;
Iy = 2499;
m1 = 40; m2 = 40; m3 = 35; m4=35;
```

[1] Priedai pateikti pridėtoje kompaktinėje plokštelėje

```
c1 = 2088; c2 = 2088; c3=2088; c4=2088;
k1 = 18557; k2 = 18557; k3 = 18557; k4 = 18557;
ct1 = 100; ct2 = 100; ct3 = 100; ct4 = 100;
kt1 = 140000; kt2 = 140000; kt3 = 140000; kt4 = 140000;
ct11 = 200; ct22 = 200; ct33 = 200; ct44 = 200;
kt11 = 220000; kt22 = 220000; kt33 = 220000; kt44 = 220000;
a11 = 1.5; a22 = 1.5; a1 = 0.74; a2 = 0.74;
b11 = 1.685; b22 = 2.345; b1 = 1.32; b2 = 1.29;
h_fi = 0.6;
h_theta = 0.495;

deltaz11 = delta_z_11_22;        % slydimo sistemos pakelimo pa-
deties ivestis (-0.210/-0.150; -0.165/-0.125; -0.140/-0.075; -
0.090/-0.045)
deltaz22 = delta_z_11_22;
deltaz33 = delta_z_33_44;
deltaz44 = delta_z_33_44;

ddotz_1 = z(2);
ddotz_2 = 1 / m * ...
    ( - c1 * (z(2) - z1(2) + a1 * fi(2) - b1 * theta(2))...
      - c2 * (z(2) - z2(2) - a2 * fi(2) - b1 * theta(2))...
      - c3 * (z(2) - z3(2) + a1 * fi(2) + b2 * theta(2))...
      - c4 * (z(2) - z4(2) - a2 * fi(2) + b2 * theta(2))...
      - k1 * (z(1) - z1(1) + a1 * fi(1) - b1 * theta(1))...
      - k2 * (z(1) - z2(1) - a2 * fi(1) - b1 * theta(1))...
      - k3 * (z(1) - z3(1) + a1 * fi(1) + b2 * theta(1))...
      - k4 * (z(1) - z4(1) - a2 * fi(1) + b2 * theta(1))...
      - ct11 * (z(2) - v_z011 + a11 * fi(2) - b11 * theta(2))...
      - ct22 * (z(2) - v_z022 - a22 * fi(2) - b11 * theta(2))...
      - ct33 * (z(2) - v_z033 + a11 * fi(2) + b22 * theta(2))...
      - ct44 * (z(2) - v_z044 - a22 * fi(2) + b22 * theta(2))...
      - kt11 * (z(1) - (z011+deltaz11) + a11 * fi(1) - b11 * the-
ta(1))...
      - kt22 * (z(1) - (z022+deltaz22) - a22 * fi(1) - b11 * the-
ta(1))...
      - kt33 * (z(1) - (z033+deltaz33) + a11 * fi(1) + b22 * the-
ta(1))...
      - kt44 * (z(1) - (z044+deltaz44) - a22 * fi(1) + b22 * the-
ta(1))...
      - 9.81 * m );

ddotfi_1 = fi(2);
ddotfi_2 = 1 / Ix * ...
    ( - c1 * a1 * (z(2) - z1(2) + a1 * fi(2) - b1 * theta(2))...
      + c2 * a2 * (z(2) - z2(2) - a2 * fi(2) - b1 * theta(2))...
      - c3 * a1 * (z(2) - z3(2) + a1 * fi(2) + b2 * theta(2))...
      + c4 * a2 * (z(2) - z4(2) - a2 * fi(2) + b2 * theta(2))...
      - k1 * a1 * (z(1) - z1(1) + a1 * fi(1) - b1 * theta(1))...
      + k2 * a2 * (z(1) - z2(1) - a2 * fi(1) - b1 * theta(1))...
      - k3 * a1 * (z(1) - z3(1) + a1 * fi(1) + b2 * theta(1))...
```

```
      + k4 * a2 * (z(1) - z4(1) - a2 * fi(1) + b2 * theta(1))...
      - ct11 * a11 * (z(2) - v_z011 + a11 * fi(2) - b11 * the-
ta(2))...
      + ct22 * a22 * (z(2) - v_z022 - a22 * fi(2) - b11 * the-
ta(2))...
      - ct33 * a11 * (z(2) - v_z033 + a11 * fi(2) + b22 * the-
ta(2))...
      + ct44 * a22 * (z(2) - v_z044 - a22 * fi(2) + b22 * the-
ta(2))...
      - kt11 * a11 * (z(1) - (z011+deltaz11) + a11 * fi(1) - b11 *
theta(1))...
      + kt22 * a22 * (z(1) - (z022+deltaz22) - a22 * fi(1) - b11 *
theta(1))...
      - kt33 * a11 * (z(1) - (z033+deltaz33) + a11 * fi(1) + b22 *
theta(1))...
      + kt44 * a22 * (z(1) - (z044+deltaz44) - a22 * fi(1) + b22 *
theta(1))...
      + m * ay * h_fi * cos(fi(1)) + m * g * h_fi * sin(fi(1)) );

ddottheta_1 = theta(2);
ddottheta_2 = 1 / Iy * ...
    ( + c1 * b1 * (z(2) - z1(2) + a1 * fi(2) - b1 * theta(2))...
      + c2 * b1 * (z(2) - z2(2) - a2 * fi(2) - b1 * theta(2))...
      - c3 * b2 * (z(2) - z3(2) + a1 * fi(2) + b2 * theta(2))...
      - c4 * b2 * (z(2) - z4(2) - a2 * fi(2) + b2 * theta(2))...
      + k1 * b1 * (z(1) - z1(1) + a1 * fi(1) - b1 * theta(1))...
      + k2 * b1 * (z(1) - z2(1) - a2 * fi(1) - b1 * theta(1))...
      - k3 * b2 * (z(1) - z3(1) + a1 * fi(1) + b2 * theta(1))...
      - k4 * b2 * (z(1) - z4(1) - a2 * fi(1) + b2 * theta(1))...
      + ct11 * b11 * (z(2) - v_z011 + a11 * fi(2) - b11 * the-
ta(2))...
      + ct22 * b11 * (z(2) - v_z022 - a22 * fi(2) - b11 * the-
ta(2))...
      - ct33 * b22 * (z(2) - v_z033 + a11 * fi(2) + b22 * the-
ta(2))...
      - ct44 * b22 * (z(2) - v_z044 - a22 * fi(2) + b22 * the-
ta(2))...
      + kt11 * b11 * (z(1) - (z011+deltaz11) + a11 * fi(1) - b11 *
theta(1))...
      + kt22 * b11 * (z(1) - (z022+deltaz22) - a22 * fi(1) - b11 *
theta(1))...
      - kt33 * b22 * (z(1) - (z033+deltaz33) + a11 * fi(1) + b22 *
theta(1))...
      - kt44 * b22 * (z(1) - (z044+deltaz44) - a22 * fi(1) + b22 *
theta(1))...
      - m * ax * h_theta * cos(theta(1)) - m * g * h_theta *
sin(theta(1)) );

ddotz1_1 = z1(2);
ddotz1_2 = 1 / m1 * ...
           ( c1 * (z(2) - z1(2) + a1 * fi(2) - b1 * theta(2))...
```

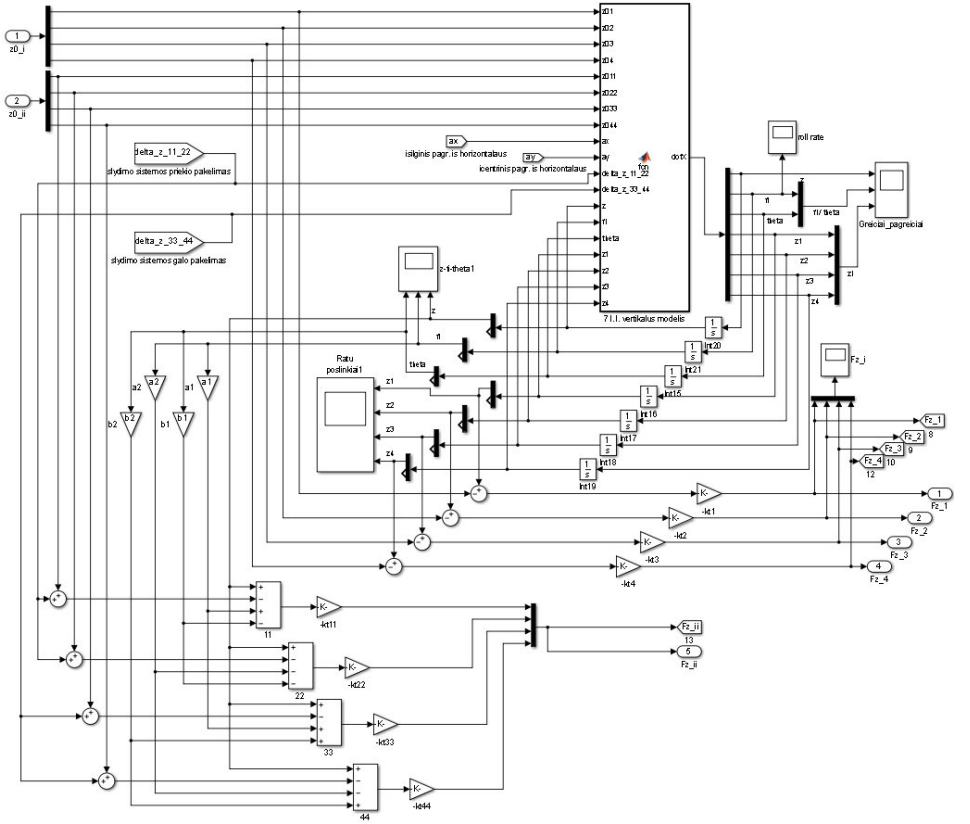
```
              + k1 * (z(1) - z1(1) + a1 * fi(1) - b1 * theta(1))...
              - ct1 * (z1(2) - v_z01)- kt1 * (z1(1) - z01) - 9.81 *
m1 );

ddotz2_1 = z2(2);
ddotz2_2 = 1 / m2 * ...
           ( c2 * (z(2) - z2(2) - a2 * fi(2) - b1 * theta(2))...
             + k2 * (z(1) - z2(1) - a2 * fi(1) - b1 * theta(1))...
             - ct2 * (z2(2) - v_z02)- kt2 * (z2(1) - z02) - 9.81 *
m2 );

ddotz3_1 = z3(2);
ddotz3_2 = 1 / m3 * ...
           ( c3 * (z(2) - z3(2) + a1 * fi(2) + b2 * theta(2))...
             + k3 * (z(1) - z3(1) + a1 * fi(1) + b2 * theta(1))...
             - ct3 * (z3(2) - v_z03)- kt3 * (z3(1) - z03) - 9.81 *
m3 );

ddotz4_1 = z4(2);
ddotz4_2 = 1 / m4 * ...
           ( c4 * (z(2) - z4(2) - a2 * fi(2) + b2 * theta(2))...
             + k4 * (z(1) - z4(1) - a2 * fi(1) + b2 * theta(1))...
             - ct4 * (z4(2) - v_z04)- kt4 * (z4(1) - z04) - 9.81 *
m4 );

dotX = [ddotz_1; ddotz_2; ddotfi_1; ddotfi_2; ddottheta_1;...
    ddottheta_2; ddotz1_1; ddotz1_2; ddotz2_1; ddotz2_2; ...
    ddotz3_1; ddotz3_2; ddotz4_1; ddotz4_2];
```



P.A.1 pav. Vertikaliųjų jėgų modelio grafinio programavimo vaizdas programos *MATLA/Simulink* aplinkoje

Fig. P.A.1. View of graphic programming of vertical model in program *MATLAB/Simulink* environment