**function [Kx, Kr] = ObtainDoublePendulumFeedback()**

**g = 9.8;**

**A = [0 0 0 1 0 0; 0 0 0 0 1 0; 0 0 0 0 0 1; 0 -2\*g 0 0 0 0; 0 3\*g -g 0 0 0; 0 -3\*g 3\*g 0 0 0];**

**B = [0;0;0;1;-1;1];**

**des\_poles = [-0.5+0.5244j, -0.5-0.5244j, 0,-0.75,-0.8,-0.8];**

**C1 = [1 0 0 0 0 0]; % Position of cart**

**C2 = [0 1 0 0 0 0]; % Angle of first mass**

**C3 = [0 0 1 0 0 0]; % Angle of second mass**

**C = C2;**

**[Kx,Kr] = placePoles(A,B,C,des\_poles) %#ok<NOPRT>**

**G1 = ss(A-B\*Kx, B\*Kr, C1, 0);**

**G2 = ss(A-B\*Kx, B\*Kr, C2, 0);**

**G3 = ss(A-B\*Kx, B\*Kr, C3, 0);**

**G = G1;**

**U = ss(A-B\*Kx, B\*Kr, -Kx, Kr);**

**step(G);**

**hold on;**

**step(G2);**

**step(U);**

**legend('x(t)','\theta\_1(t)','\theta\_2(t)');**

**xlabel('Time (s)'); title('Linearized System Model: Step Response');**

**hold off;**

**end**