clc;clear;close all;

syms m\_p L\_p L\_r J\_p J\_r

syms alpha(t) theta(t) t taw

syms D\_p D\_r g

Eq1=(m\_p\*L\_r^2+0.25\*m\_p\*L\_p^2\*(1-cos(alpha(t)))+J\_r)\*...

diff(theta,2)-0.5\*m\_p\*L\_p\*L\_r\*cos(alpha)\*diff(alpha,2)+...

0.5\*m\_p\*L\_p^2\*sin(alpha)\*cos(alpha)\*diff(theta)\*diff(alpha)+...

0.5\*m\_p\*L\_p\*L\_r\*sin(alpha)\*alpha^2==taw-D\_r\*diff(theta)

Eq2=0.5\*m\_p\*L\_p\*L\_r\*cos(alpha)\*diff(theta,2)+(J\_p+0.25\*m\_p\*L\_p^2)\*diff(alpha,2)...

-0.25\*m\_p\*L\_p^2\*cos(alpha)\*sin(alpha)\*diff(theta)^2+0.5\*m\_p\*L\_p\*g\*sin(alpha)==-D\_p\*diff(alpha)

Eq3=isolate(Eq1,diff(theta,2))

Eq4=isolate(Eq2,diff(alpha,2))

Eq5=subs(Eq3,diff(alpha,2),rhs(Eq4));

Eq5=isolate(Eq5,diff(theta,2));

Eq5=simplifyFraction(Eq5)

% simplify(rhs(Eq5),"Steps",10)

% expand(Eq5)

% a=factor(rhs(Eq5),diff(theta))

Eq6=subs(Eq4,diff(theta,2),rhs(Eq3));

Eq6=isolate(Eq6,diff(alpha,2));

Eq6=simplifyFraction(Eq6)