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function [w] = model_3(Theta)

% Purpose: calculations for model 3 - models a unbalanced wheel with a
% support structure as it
% rolls down a hill. The extra mass is inserted at a certain radius
% from the
% center, and is modelled as a point mass
% Authors: Jacob Starkel, Krystal Horton, Cate Billings, and Zak
% Reichenbach
% Date Completed: 3/12/2021

```

Givens

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m_cylinder = 11.7; % [kg]
m_supports = 0.7; % [kg]
m_extra = 3.4; % [kg]
r_cylinder = .235; % [m]
k = .203; % [m]
I = m_cylinder*k^2; % [kgm^2]
beta = 5.5; % slope of ramp [degrees]
radius_to_extra = .178; % [m]
g = 9.81; % [m/s^2]
T = [1 1.2 1.4 1.45 1.5]; % torque friction of bearing
m_t = m_cylinder + m_supports; % [kg]

```

Model 3

```

phi=Theta+(beta*(pi/180));

Num_3 = 2 *(m_t*g*r_cylinder*Theta*sind(beta) +
    m_extra*g*(r_cylinder*Theta*sind(beta)+ radius_to_extra.*cosd(beta)-
    radius_to_extra.*cos(phi))- T(5)*Theta);
Denom_3 = ((m_t+(I/r_cylinder)))+(m_extra*(1+2*(radius_to_extra^2/
    r_cylinder^2)*(1+cos(Theta)))));
Quotient_3 = Num_3./Denom_3;
V_c_3= sqrt(Quotient_3);

w = V_c_3/r_cylinder;

Not enough input arguments.

Error in model_3 (line 22)
phi=Theta+(beta*(pi/180));

end

```

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