Dynamics Process Guidesheet

Topic

Planar Kinetics: Force and Acceleration

Governing Equations and Assumptions

Translation

$\Sigma F_x = m(a_G)_x$

$\Sigma F_y = m(a_G)_y$

$\Sigma M_P = \Sigma (M_K)_P$ or $\Sigma M_G = 0$

Rotation about a Fixed Axis

$\Sigma F_t = m\alpha r$

$\Sigma F_n = m\omega^2 r$

$\Sigma M_G = I_G\alpha$ or $\Sigma M_O = I_O\alpha$

General Plane Motion

$\Sigma F_x = m(a_G)_x$

$\Sigma F_y = m(a_G)_y$

$\Sigma M_P = \Sigma (M_K)_P$

$a_G = \alpha r$ or $F_f = \mu_k N$

Process

1. Determine the type motion
2. Draw Free-Body Diagram and Kinetic Diagram
3. Apply the correct Kinetic equations
   => General Plane Motion => Verify rolling versus slipping