ENGR 220 – Lecture 21:
General Plane Motion and Kinetic Energy

General Plane Equations of Motion

Same eqs as combining translation/rotation eqs from previous sections

$$\sum F_x = ma_{G_x}$$

$$\sum F_y = ma_{G_y}$$

$$\sum M_G = I_G\alpha$$ → Angular acceleration due to moments about c.o.g.

or

$$\sum F_x = ma_{G_x}$$

$$\sum F_y = ma_{G_y}$$

FBD Static Moments about P = Kinetic diagram moments about P due to acceleration of c.o.g ($r_{G/P}$ x ma_G) and rotation of c.o.g. ($I_G\alpha$)

$$\sum M_P = \sum (M_k)_P = I_G\alpha + \vec{r}_{G/P} \times m\vec{a}_G$$

Kinetic moment

Diagram