CONSERVATION OF MOMENTUM MODEL

CONDITION: NO NET EXTERNAL FORCE AND/OR TORQUE ACTS ON SYSTEM

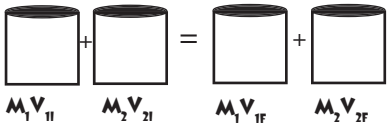
LINEAR MODEL

DEFINE POSITIVE X DIRECTION

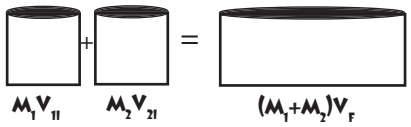
$P_I = P_F$

CASES

ELASTIC OR INELASTIC COLLISION



COMPLETELY INELASTIC COLLISION



IF COLLISION IS ELASTIC, THEN $K_I = K_F$

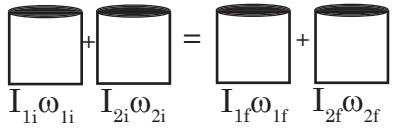
ROTATIONAL MODEL

DEFINE POSITIVE ROTATIONAL DIRECTION

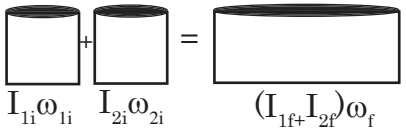
$L_I = L_F$

CASES

ELASTIC OR INELASTIC COLLISION



COMPLETELY INELASTIC COLLISION



IF COLLISION IS ELASTIC, THEN $K_I = K_F$

SUPPLEMENTAL EQUATIONS

LINEAR MOMENTUM

$$p = mv$$

LINEAR IMPULSE

$$J = \int F dt = \overline{F}\Delta t = \Delta p$$

$$F = \frac{dp}{dt}$$

CENTER OF MASS

$$r_{cm} = \frac{\sum mr}{\sum m}$$

ANGULAR MOMENTUM

$$\ell = rxp$$

DISCRETE BODIES

$$L = I\omega$$

SOLID BODIES

ANGULAR IMPULSE

$$J = \int \tau\, dt = \overline{\tau}\Delta t = \Delta L$$

$$\tau = \frac{dL}{dt}$$