Force application

09 September 2014 01:12 PM

$$F_A - F_D - F_\mu = \frac{dv}{dt} m$$

$$F_A - Dv - f_\mu = \frac{dv}{dt} m$$

$$\frac{1}{s}(F_A - F_\mu) - DV = (sV - v_0)m$$

$$sVm + DV = \frac{1}{s}(F_A - F_\mu) + v_0 m$$

$$V(s m + D) = \frac{1}{s}(F_A - F_\mu) + v_0 m$$

$$V = \frac{F_A - F_\mu}{s m + D} + \frac{v_0 m}{s m + D}$$

$$\frac{a}{s(sm+D)} = \frac{B}{s} + \frac{C}{sm+D}$$

$$a = B(sm+D) + Cs$$

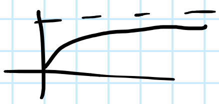
$$B = a/D \qquad C = \frac{-ma}{D}$$

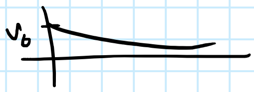
$$\frac{F_a - F_\mu}{sm+D} = \frac{F_a - F_\mu}{Ds} - \frac{m(F_a - F_\mu)}{D(sm+D)}$$

$$V = \frac{F_a - F_\mu}{Ds} - \frac{m(F_a - F_\mu)}{D(sm+D)} + \frac{v_0 m}{sm+D}$$

$$v = \frac{F_a - F_\mu}{D} - \frac{F_a - F_\mu}{D} e^{-D/m\, t} + v_0 e^{-D/m\, t}$$

$$= \frac{F_a - F_\mu}{D}\left(1 - e^{-D/m\, t}\right) + v_0 e^{-D/m\, t}$$





- reaches max speed of $\frac{F_a - F_\mu}{D}$
- initial velocity decays.
- new velocity is computed & applied each step.