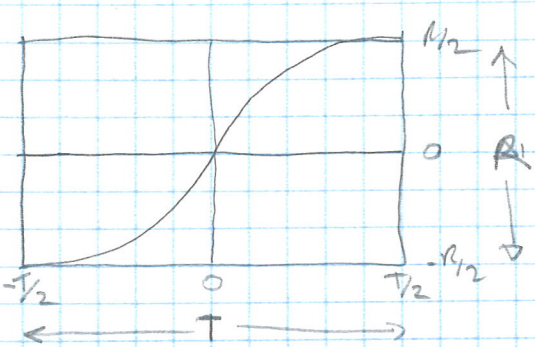
CTRM



$$r = at^3 + ct$$

$$\dot{r} = 3at^2 + c$$

① ② $\dot{r}[-T/2] = \dot{r}[T/2] = 0$ $\quad a = -\frac{2R}{T^3} \quad c = \frac{3R}{2T}$

③ $r[-T/2] = -R/2$

④ $r[T/2] = R/2$

① ② $c = -\frac{3aT^2}{4}$

③ ④ $\frac{R}{2} = \frac{aT^3}{8} + \frac{cT}{2} = \frac{aT^3}{8} - \frac{3aT^3}{8} = -\frac{aT^3}{4}$

$$R = -\frac{aT^3}{2}$$

$$a = -\frac{2R}{T^3} \qquad c = \frac{3}{4}T^2 \cdot \frac{2R}{T^3} = \frac{3R}{2T}$$

$$\therefore \quad r = at^3 + ct = t(at^2 + c) = t \cdot \frac{R}{T}\left(\frac{3}{2} - \frac{2}{T^2} \cdot t^2\right)$$

$$r = \left(\frac{3R}{2T}\right) t \left(1 - \frac{4}{3T^2} \cdot t^2\right)$$

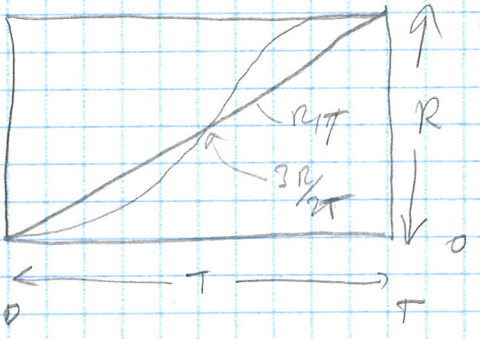
$$\boxed{r = \alpha t(1 - \beta t^2) \qquad \alpha = \frac{3R}{2T} \quad \beta = \frac{4}{3T^2}}$$

for $t = -T/2$ to $T/2$

$r = -R/2$ to $R/2$

CTRM

$$\boxed{\left.\frac{dr}{dt}\right|_{max} = \frac{3R}{2T}}$$



LTRM

$$r = ct$$

$$c = \frac{R}{T}$$

$$\left.\frac{dr}{dt}\right|_{max} = \frac{R}{T}$$