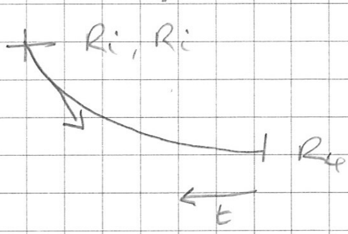
(4) Calculated parameters

$R\phi$	Top of initial parabola
$R1$	End of initial parabola
R_2	End of linear
R_3	End of exp
$T\phi$	Time of TOP OF PARABOLA (MAY BE -ve)
T_1	Time of end of parabola
T_2	Time of end of Linear
T_3	Time of end of exp
T_4	Time of end of PLEP

(5) CONDITION EQUATIONS

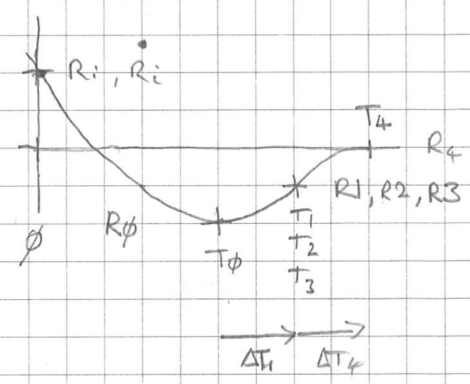


$\overline{P-P}$

$$\left.\begin{aligned} R &= R_4 + \tfrac{1}{2} a t^2 \\ \dot{R} &= at \end{aligned}\right\} R = R_4 + \frac{1}{2}\frac{\dot{R}^2}{a}$$

Limiting case $\quad Ri = R_4 + \frac{(-\dot{R}i)^2}{2a}$ $\qquad$ Note $\dot{R}i$ is -ve, a is +ve

So. $\overline{P-P}$ if $\quad \dot{R}i < -\sqrt{2a(Ri - R_4)}$



WITH $\quad T\phi = -\frac{\dot{R}i}{a}$

$$R\phi = Ri - \frac{\dot{R}i^2}{2a}$$

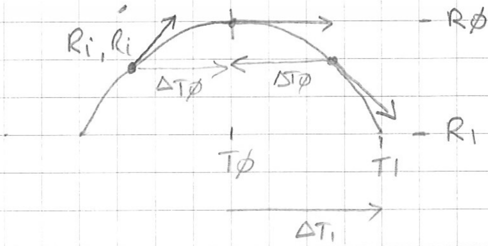
$$\Delta T_1 = \Delta T_4 = \sqrt{\frac{R_4 - R\phi}{a}}$$

$$R_1 = R_2 = R_3 = \frac{R_4 - R\phi}{2}$$

$$T_1 = T_2 = T_3 = T\phi + \Delta T_1$$

$$T_4 = T_3 + \Delta T_4$$

P - P, P - L - P, P - E - P, P - L - E - P

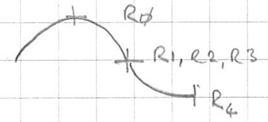


$$T\phi = \frac{\dot{R}_i}{a} \qquad (a \text{ +ve})$$

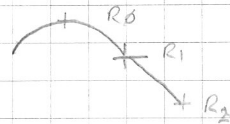
$$R\phi = R_i + \frac{\dot{R}_i^2}{2a}$$

Parabola can join:

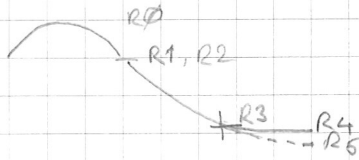
a. Parabola $\quad \Delta T_{1_{PP}} = \sqrt{\frac{(R\phi - R_4)}{a}}$



b. Linear $\quad \Delta T_{1_{PL}} = \frac{l}{a}$



c. Exponential $\quad \Delta T_{1_{PE}} = \sqrt{\left(T_c^2 + \frac{2(R\phi - R_5)}{a}\right)} - T_c$



If $(\Delta T_{1_{PP}} < \Delta T_{1_{PL}})$ && $(\Delta T_{1_{PP}} < \Delta T_{1_{PE}})$ $\longrightarrow$ P - P

else if $(\Delta T_{1_{PE}} < \Delta T_{1_{PL}})$ $\longrightarrow$ P - E - P

else $\longrightarrow$ P - L - P or P - L - E - P

Derivation of $\Delta T_{1_{PE}}$:

$$\left.\begin{array}{ll} \text{for Parabola:} & \dot{R}_1 = -a\Delta T_1 \\ \text{for exp:} & \dot{R}_1 = \dfrac{-R_1 + R_5}{T_c} \end{array}\right\} -aT_c\,\Delta T_1 = -R_1 + R_5$$

where $\quad R_1 = R_0 - \frac{a\,\Delta T_1^2}{2}$

$$\therefore \quad aT_c\,\Delta T_1 - \left(R_0 - \frac{a\,\Delta T_1^2}{2}\right) + R_5 = \phi$$

$$\therefore \quad \left(\frac{a}{2}\right)\Delta T_1^2 + (aT_c)\,\Delta T_1 - (R_0 - R_5) = \phi$$

$$\therefore \quad \Delta T_1^2 = \frac{-aT_c \pm \sqrt{a^2T_c^2 + 4\left(\frac{a}{2}\right)(R_0 - R_5)}}{2\left(\frac{a}{2}\right)}$$

Taking +ve root: $\quad \Delta T_{1_{PE}} = \sqrt{T_c^2 + \frac{2(R_0 - R_5)}{a}} - T_c$