Thursday: Project 2

Sections:

1. Abstract & Intro

2. "Parallel Analysis"

3. Intersection Analysis

Part (0)

- Title Page & Title
- Abstract
  - See example on ELC
  - Short: ≈ 1/2 page
- Intro
  - Physical situation
  - Write this last
  - What is the major question and answer? ★★★
  - Remember target audience

Part (1) · Parallel Analysis

1) $\ln(G) = r\ln(m) - at + c$

$$0 = r\ln(m) - at + c - \ln(G)$$

$$\Rightarrow F_1(G, r, m, a, t, c) = r\ln(m) - at + c - \ln(G)$$

Interested in $F_1(\underline{G}, \underline{r}, \underline{m}, \underline{a}, \underline{t}, \underline{c}) = 0$

Numerical estimates   Indep. vars.

$r\ln(m) - at + c - \ln(G) = 0$ Solve for m (ort)

$\Rightarrow \ln(m^r) = \ln(G) - (-at + c)$

$\Rightarrow e^{\ln(m^r)} = e^{\ln(G) - (-at+c)}$

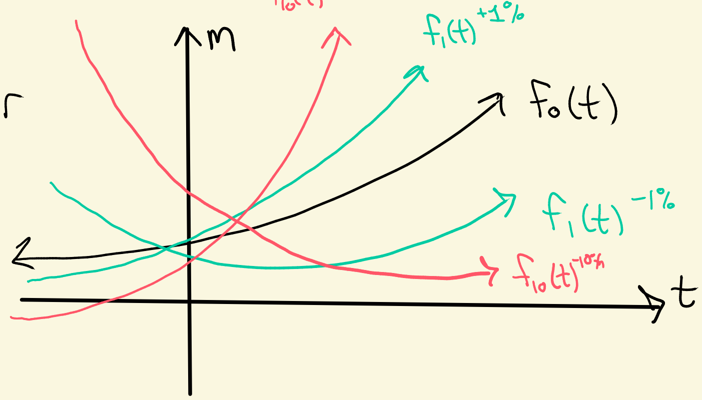
$\Rightarrow m^r = G \cdot e^{at - c}$

$$\boxed{\Rightarrow m = \left(G \cdot e^{at-c}\right)^{\frac{1}{r}}.}$$

Double Check! (Rederive)

$m(G, a, t, c, r) = \left(G \cdot e^{at - c}\right)^{\frac{1}{r}} = m(t) = f_0(t)$

One graph for each variable



$\boxed{f_1(t) : \text{ modify } G \text{ by} \pm 1\%}$ Repeat

$F_2(t)$: Modify a by $\pm 1\%$

⋮

Repeat for the second function

$I = i_0 \, m^d \, e^{-E/kt}$

$\boxed{d = 3/4.}$ Remember!

$\Rightarrow 0 = \underbrace{i_0 \, m^d \, e^{-E/kt} - I}_{F_2(i_0, m, d, E, k, t, I)}$

Numerical est.

$$I = i_o\, m^d\, e^{-E/kt}$$ Solve for m

$$\Rightarrow \frac{I}{i_o} e^{E/kt} = m^d$$

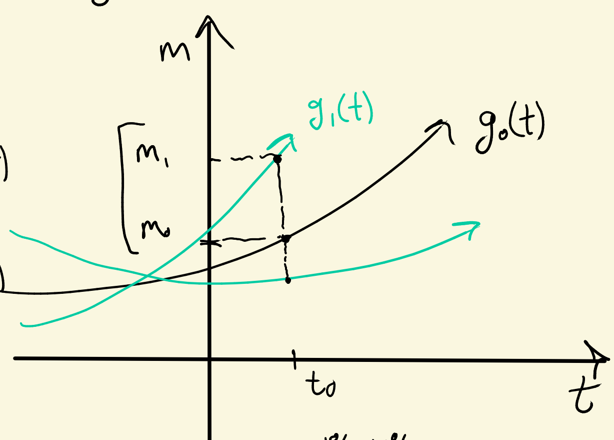
$$\Rightarrow \boxed{\left(\frac{I}{i_o} e^{E/kt}\right)^{\frac{1}{d}} = m}$$

$$\underbrace{\left(I' e^{E/kt}\right)^{\frac{1}{d}}} \qquad \boxed{I' = \frac{I}{i_o}}$$

$$m(I', E, k, t, d) = m(t) = g_o(t)$$

- Vary I' by $\pm 1\%$, $\pm 10\%$ $\rightarrow g_1(t)$
- " E " $\rightarrow g_2(t)$

⋮ ⋮



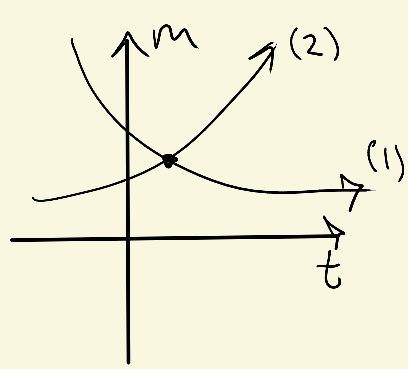
Compute $\frac{\Delta I'}{\Delta m}$ ← 1%, 10% ; Δm ← $m_1 - m_o$

Part (3)

$$m = \left(G \cdot e^{-at + c}\right)^{\frac{1}{r}} \qquad (1)$$

$$m = \left(\frac{I}{i_o} e^{E/kt}\right)^{\frac{1}{d}} \qquad (2)$$

Plot together



$$\left(G\cdot e^{-at+c}\right)^{\frac{1}{r}} = \left(I' e^{E/kt}\right)^{1/d}$$

Solve for t

$$\Rightarrow \left(G\cdot e^{-at+c}\right)^{\frac{d}{r}} = I' e^{E/kt}$$

$$\Rightarrow \ln\left(\left(G\cdot e^{-at+c}\right)^{\frac{d}{r}}\right) = \ln\left(I' e^{E/kt}\right)$$

$$\Rightarrow (d/r)\ln\left(G\cdot e^{-at+c}\right) = \ln\left(I'\right) + \ln\left(e^{E/kt}\right)$$

$$\Rightarrow \left(\frac{d}{r}\right)\left[\ln(G) + \ln\left(e^{-at+c}\right)\right] = \ln(I') + \left(\frac{E}{kt}\right)$$

$$\Rightarrow \quad 0 = \left(\frac{r}{d}\right)\left(\ln(I') + \left(\frac{E}{kt}\right)\right) - \ln(G) - (-at+c)$$

$$0 = \frac{t\,r\ln(I')}{d} + \frac{rE}{kd} - t\ln(G) + at^2 - ct$$

$$\Rightarrow 0 = \left.\begin{aligned} & \left. t^2(a) \right] A \\ & \left. + t^1\left(\frac{r\ln(I')}{d} - \ln(G) - c\right)\right] B \\ & \left. + t^0\left(\frac{rE}{kd}\right)\right] C \end{aligned}\right]$$

$$0 = At^2 + Bt + C$$

$\Rightarrow$ quadratic formula