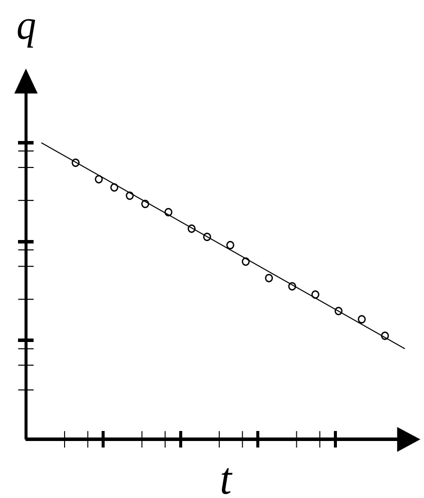
Harmonic Decline

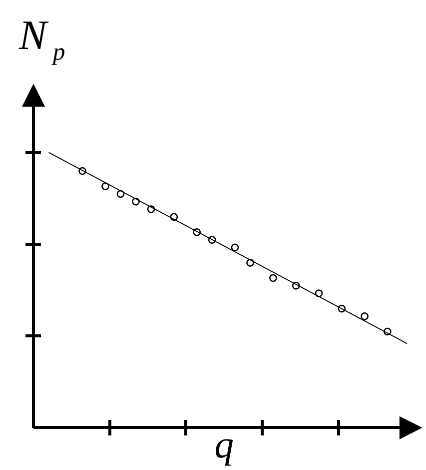
d=1

$$q = \frac{q_0}{(1 + dbt)^{1/d}}$$

$$N_p = \frac{q_0}{b} \ln(1 + bt)$$

$$b = \frac{\frac{q_0}{q_1} - 1}{t_1}$$

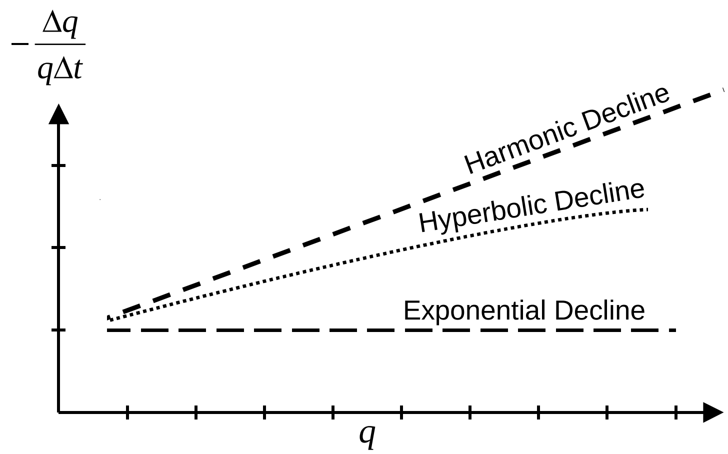




Hyperbolic Decline

$$q = \frac{q_0}{\left(1 + \frac{b}{a} t\right)^a}$$

$$N_p = \frac{a}{b(a-1)}\left[q_0 - q\left(1 + \frac{b}{a} t\right)\right]$$



1. Select points (t_1, q_1) and (t_2, q_2)

2. Read t_3 at $q_3 = \sqrt{q_1 q_2}$

3. Calculate $\left(\frac{b}{a}\right) = \frac{t_1 + t_2 - 2t_3}{t_3^2 - t_1 t_2}$

4. Find q_0 at $t = 0$

5. Pick up any point (t_*, q_*)

6. Use

$$q_* = \frac{q_0}{\left(1 + \left(\frac{b}{a}\right) t_*\right)^a} \Rightarrow a = \frac{\log\left(\frac{q_0}{q_*}\right)}{\log\left(1 + \left(\frac{b}{a}\right) t_*\right)}$$

7. Finally $b = \left(\frac{b}{a}\right) a$