Eq. (1)

$$\frac{\partial p(x)}{\partial t} = \frac{\partial}{\partial x}[\gamma_2 x p(x)] + k_1 \int_0^x dx' w(x,x') p(x').$$

where $w(x,x') = w(x-x') = \nu(x-x') - \delta(x-x')$

$$\frac{\partial p(x)}{\partial t} = 0 \Rightarrow -\frac{\partial}{\partial x}[x p(x)] = \overset{a = \frac{k_1}{\gamma_2}}{a} w * p(x)$$

$$\xrightarrow{\text{Laplace}} \quad s \frac{\partial \hat{p}(s)}{\partial s} = a\, \hat{w}(s)\, \hat{p}(s)$$

$\nu(x) = \frac{1}{b}\exp(-\frac{x}{b})$ — exponential distribution

$$\hat{w}(s) = \int_0^\infty (\nu(x) - \delta(x)) e^{-sx} dx$$

$$= \int_0^\infty \left(\frac{1}{b}\exp(-\frac{x}{b}) e^{-sx} - \delta(x) e^{-sx}\right) dx$$

$$= \frac{1}{b} \frac{1}{s+\frac{1}{b}} (0-1) - 1$$

$$= \frac{1}{b} \frac{1}{s+\frac{1}{b}} - \frac{sb+1}{b(s+\frac{1}{b})}$$

$$= -\frac{s}{s+\frac{1}{b}}$$

$$s \frac{\partial \hat{p}}{\partial s} = a \hat{w} \hat{p}$$

$$\frac{\partial \hat{p}}{\hat{p}} = a \hat{w} \frac{\partial s}{s}$$

$$\ln \hat{p} = a \frac{-s}{s+\frac{1}{b}}$$

$$\hat{p}(0) = 1 \Rightarrow \hat{p}(s) = (s+\frac{1}{b})^{-a}$$

Eq. (6)

$$-\frac{\partial}{\partial x}[x p(x)] = a \int_0^x dx' w(x-x') c(x') p(x')$$

$$\xrightarrow{\text{Laplace}} \quad \hat{s} \frac{\partial \hat{p}}{\partial s} = a \left(\frac{-s}{s+\frac{1}{b}}\right) \mathcal{L}[c \cdot p]$$

$$= a \left(\frac{-s}{s+\frac{1}{b}}\right) (\hat{c} * \hat{p})$$

$$\frac{\partial \hat{p}}{\partial s} = a \left(\frac{-1}{s+\frac{1}{b}}\right) (\hat{c} * \hat{p})$$

$$\xrightarrow{\times (s+\frac{1}{b})} \quad s \frac{\partial \hat{p}}{\partial s} + \frac{1}{b} \frac{\partial \hat{p}}{\partial s} = -a\, \hat{c} * \hat{p}$$

$$\xrightarrow{\text{Laplace}} \quad -\frac{\partial}{\partial x}[x p(x)] - \frac{1}{b} x p = -acp$$

$$\frac{\partial}{\partial x}(xp) + \frac{xp}{b} = acp$$