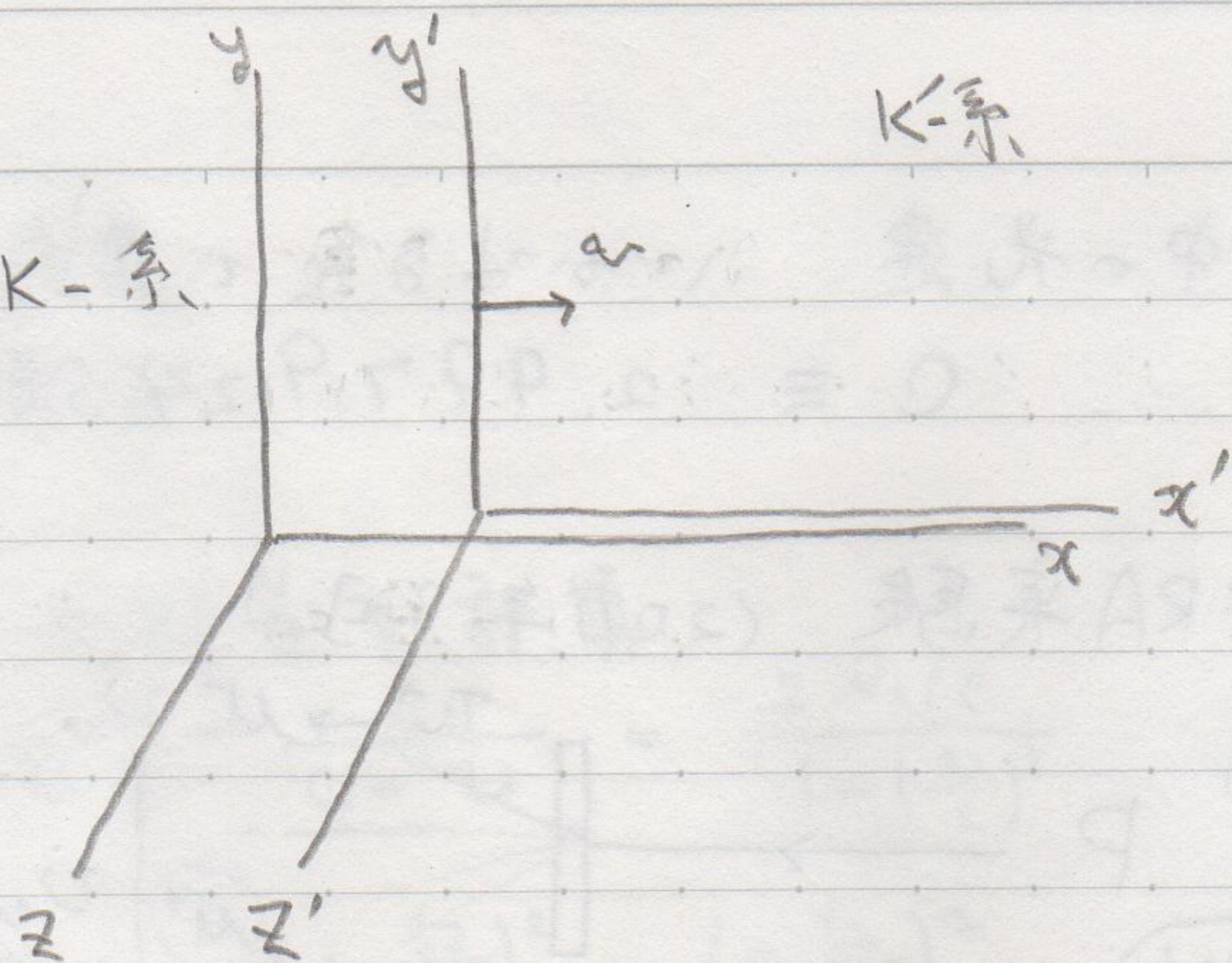


$$\begin{cases} ct' = a_{00} ct + a_{01} x & \text{(i)} \\ x' = a_{10} ct + a_{11} x & \text{(ii)} \\ y' = y & \text{(iii)} \\ z' = z & \text{(iv)} \end{cases} \quad K\text{-系}$$



$$L_x = \begin{pmatrix} a_{00} & a_{10} & 0 & 0 \\ a_{10} & a_{11} & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

$$\begin{aligned} K \rightarrow K' & \quad x' = -\gamma \beta ct + \gamma x \\ K' \rightarrow K & \quad x = \gamma \beta ct' + \gamma x' \end{aligned}$$

これは相対性原理

・ O' を両方の系でみる

$$K \mid x = vt$$

(ii)

$$0 = a_{10} ct + a_{11} x$$

$$K' \mid x' = 0$$

$$\frac{a_{10}}{a_{11}} = -\frac{v}{c} \quad (1)$$

・ O を両方の系でみる

$$K \mid x' = -vt'$$

(i)

$$ct' = a_{00} ct$$

$$\frac{a_{10}}{a_{00}} = -\frac{v}{c}$$

$$K' \mid x = 0$$

$$(x') = a_{10} ct$$

(2)

①②から

$$a_{00} = a_{10} (\equiv \gamma)$$

・ $t = t' = 0$ で原点から x 方向に光を放出

$$K \text{ 系 } x = ct$$

$$(i) \quad ct' = a_{00} ct + a_{01} ct$$

$$K' \text{ 系 } x' = ct'$$

$$(ii) \quad ct' = a_{10} ct + a_{11} ct$$

$$a_{00} = a_{10} = \gamma$$

$$a_{01} = a_{11} = -\frac{v}{c} \gamma$$

$$\beta \equiv \frac{v}{c}$$