

# 旋转加平移

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$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} + \begin{pmatrix} a \\ b \end{pmatrix}$$

若要使得对一个东西的多次测量误差最小，即要使得 $\sum (x' - x)^2 + (y - y')^2$ 最小

$$\min \sum (x_i \cos\theta + y_i \sin\theta + a - \bar{x})^2 + (-x_i \sin\theta + y_i \cos\theta + b - \bar{y})^2$$

求导有

$$\sum (x_i \cos\theta + y_i \sin\theta + a - \bar{x}) = 0$$

$$\sum (-x_i \sin\theta + y_i \cos\theta + b - \bar{y}) = 0$$

$$\begin{aligned} &\sum (x_i \cos\theta + y_i \sin\theta + a - \bar{x})(-x_i \sin\theta + y_i \cos\theta) + \\ &(-x_i \sin\theta + y_i \cos\theta + b - \bar{y})(-x_i \cos\theta - y_i \sin\theta) = 0 \end{aligned}$$