

# Vzájemné vztahy mezi souřadnicovými soustavami

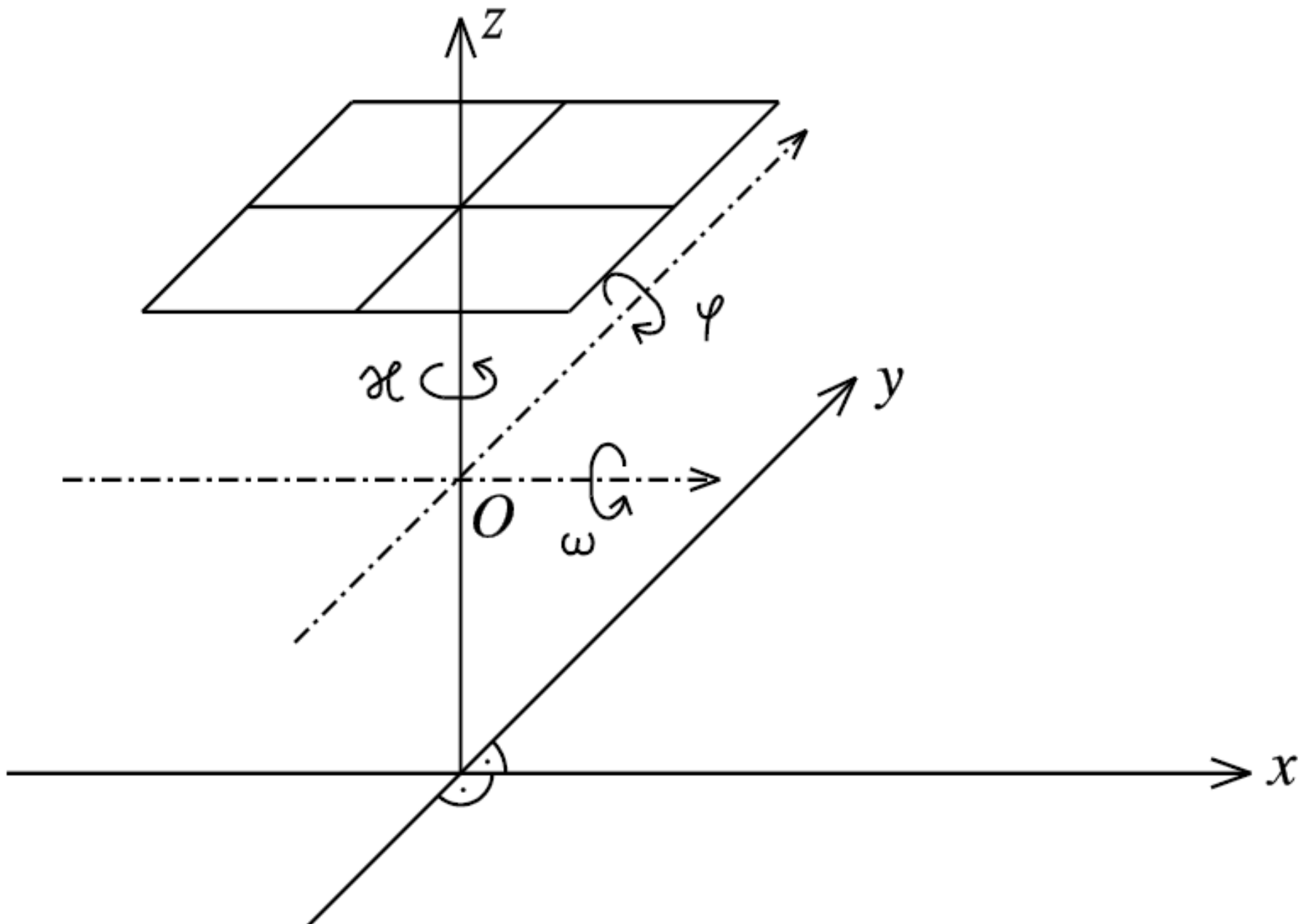
Převod mezi souř. snímkových souřadnic a sous. fiktivního snímku

$$\begin{pmatrix} x'_F \\ y'_F \\ z'_F \end{pmatrix} = \mathbf{R} \begin{pmatrix} x' \\ y' \\ z' \end{pmatrix}$$

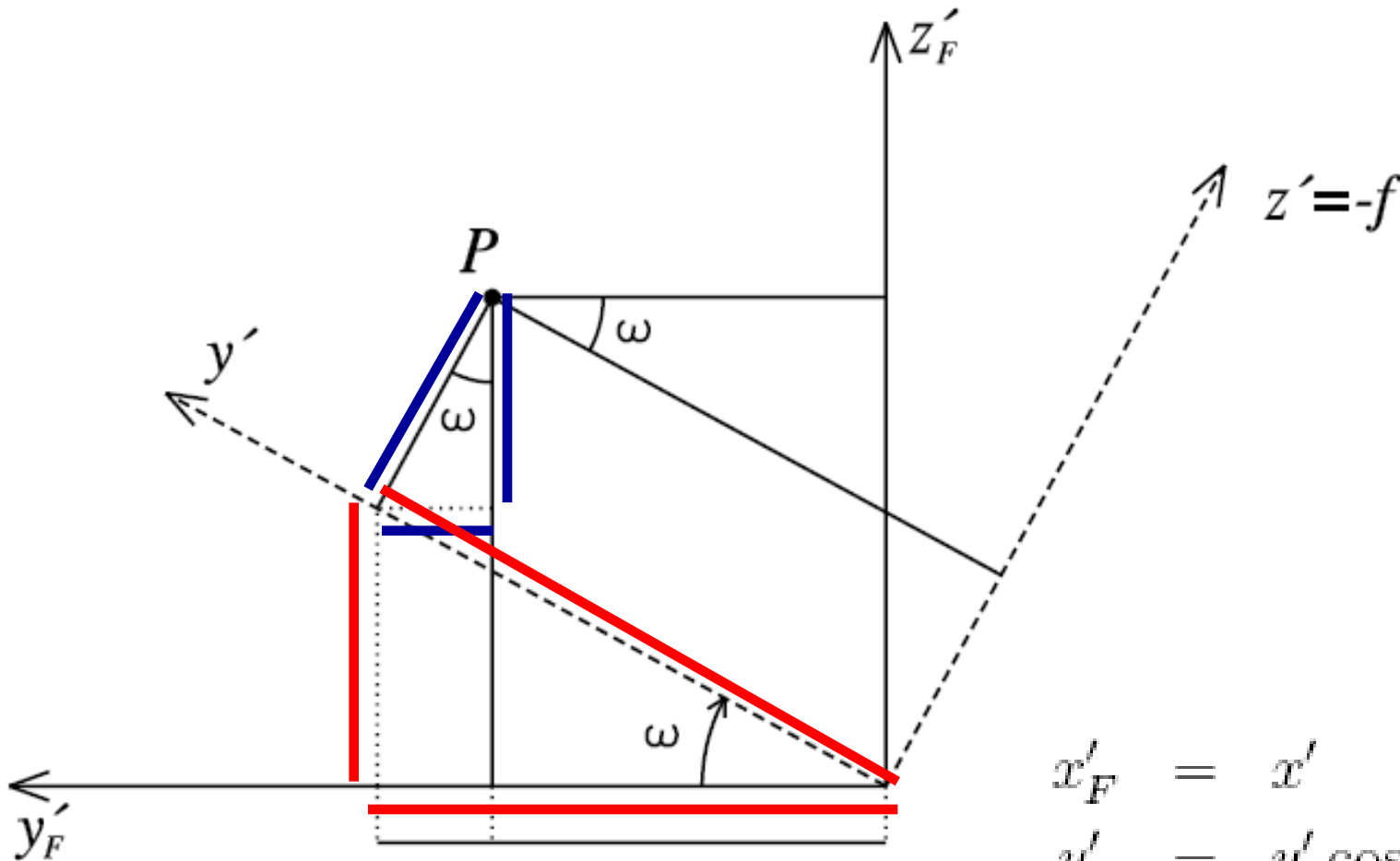
$$\mathbf{R} = \begin{pmatrix} r_{11} & r_{12} & r_{13} \\ r_{21} & r_{22} & r_{23} \\ r_{31} & r_{32} & r_{33} \end{pmatrix}$$

$$\begin{pmatrix} x' \\ y' \\ z' \end{pmatrix} = \mathbf{R}^T \begin{pmatrix} x'_F \\ y'_F \\ z'_F \end{pmatrix}$$

# Prostorová transformace



# Transformace kolem osy $x'$



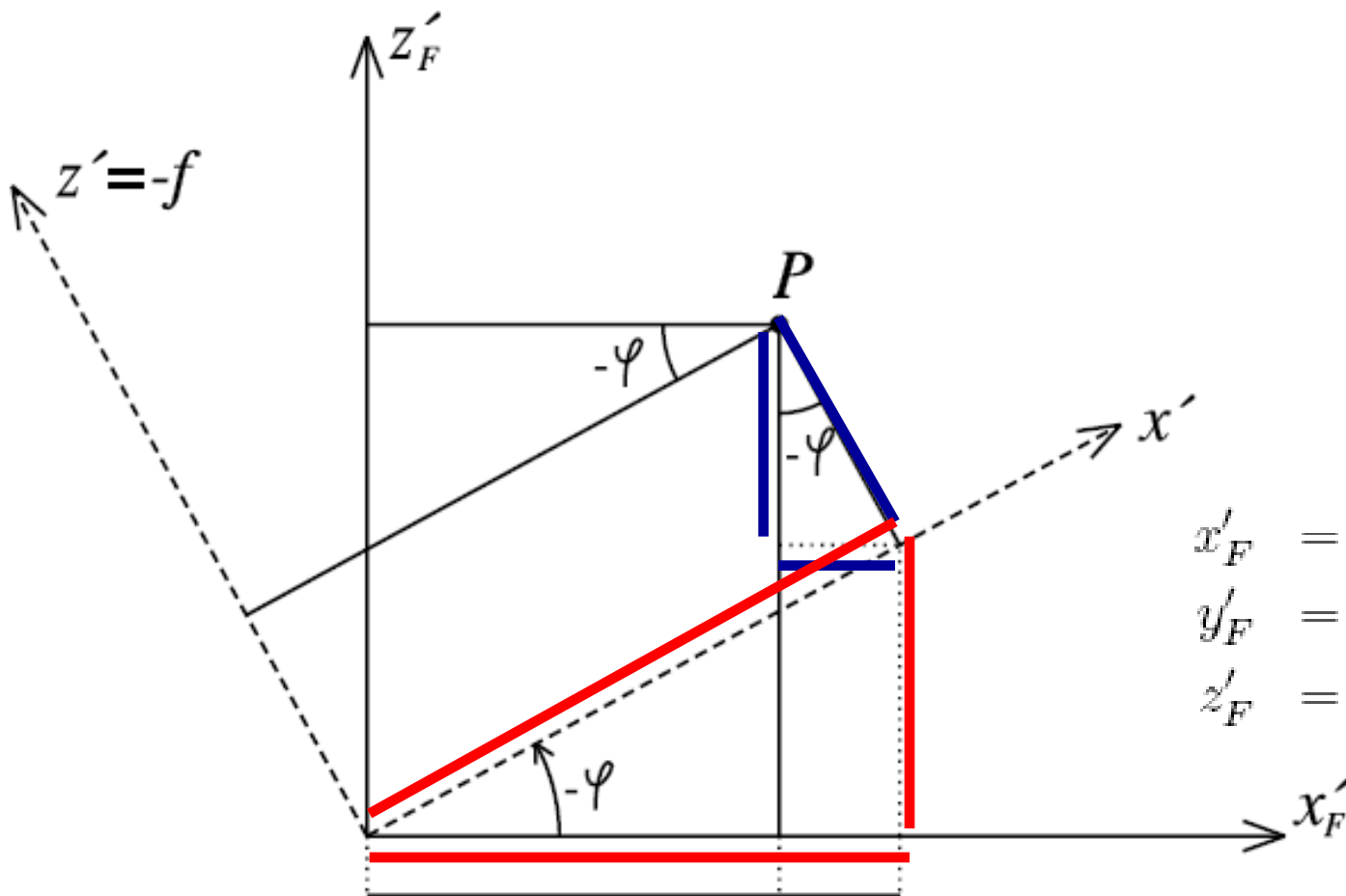
$$x'_F = x'$$

$$y'_F = y' \cos \omega - z' \sin \omega$$

$$z'_F = y' \sin \omega - z' \cos \omega$$

$$\begin{pmatrix} x'_F \\ y'_F \\ z'_F \end{pmatrix} = \begin{pmatrix} 1 & 0 & 0 \\ 0 & \cos \omega & \sin \omega \\ 0 & -\sin \omega & \cos \omega \end{pmatrix} \begin{pmatrix} x' \\ y' \\ z' \end{pmatrix} = \mathbf{x}'_F = \mathbf{R}_\omega \mathbf{x}'$$

# Transformace kolem osy $y'$



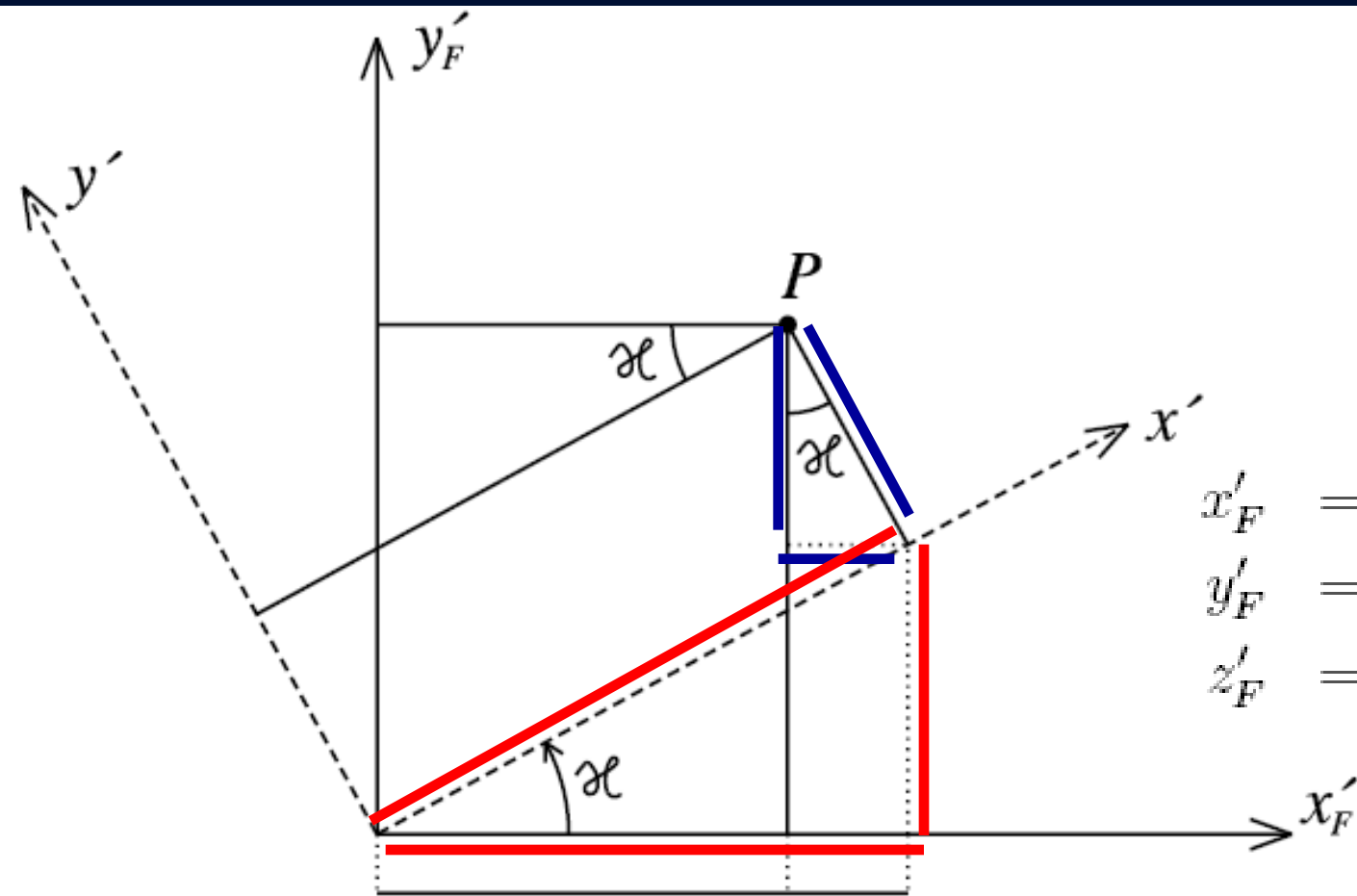
$$x'_F = x' \cos \varphi + z' \sin \varphi$$

$$y'_F = y'$$

$$z'_F = -x' \sin \varphi + z' \cos \varphi$$

$$\begin{pmatrix} x'_F \\ y'_F \\ z'_F \end{pmatrix} = \begin{pmatrix} \cos \varphi & 0 & \sin \varphi \\ 0 & 1 & 0 \\ -\sin \varphi & 0 & \cos \varphi \end{pmatrix} \begin{pmatrix} x' \\ y' \\ z' \end{pmatrix} = \mathbf{x}'_F = \mathbf{R}_\varphi \mathbf{x}'$$

# Transformace kolem osy $z'$



$$\begin{aligned}x'_F &= x' \cos \kappa - y' \sin \kappa \\y'_F &= x' \sin \kappa + y' \cos \kappa \\z'_F &= z'\end{aligned}$$

$$\begin{pmatrix} x'_F \\ y'_F \\ z'_F \end{pmatrix} = \begin{pmatrix} \cos \kappa & -\sin \kappa & 0 \\ \sin \kappa & \cos \kappa & 0 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} x' \\ y' \\ z' \end{pmatrix} = \mathbf{x}'_F = \mathbf{R}_\kappa \mathbf{x}'$$