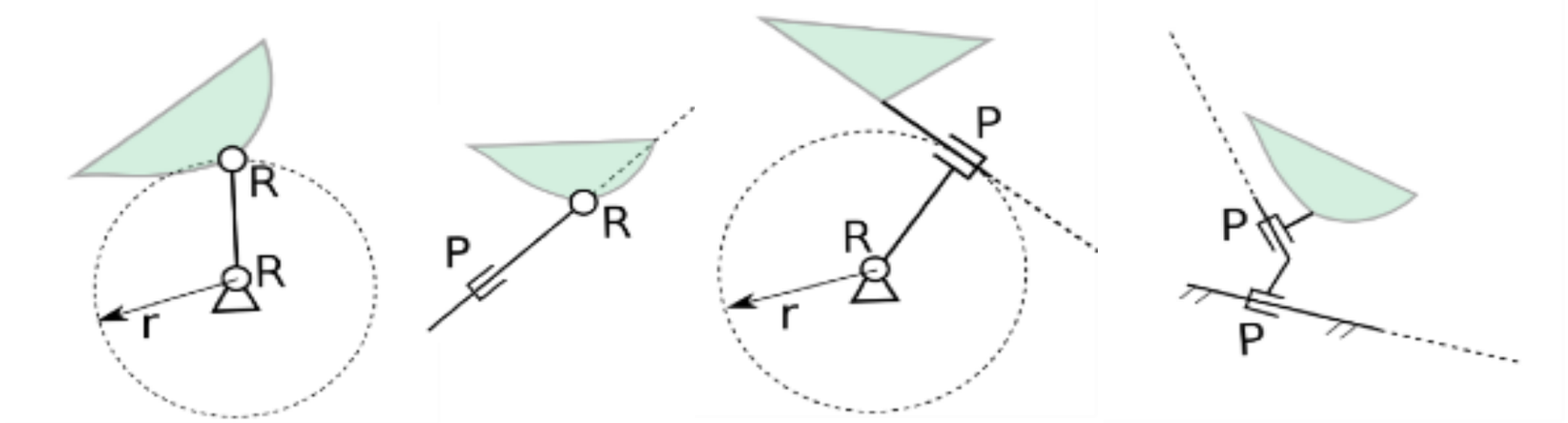
Review: Unified Representation of Dyad Constraints

- A unified treatment of the geometric constraints of the building blocks (dyads for four-bar) of mechanisms



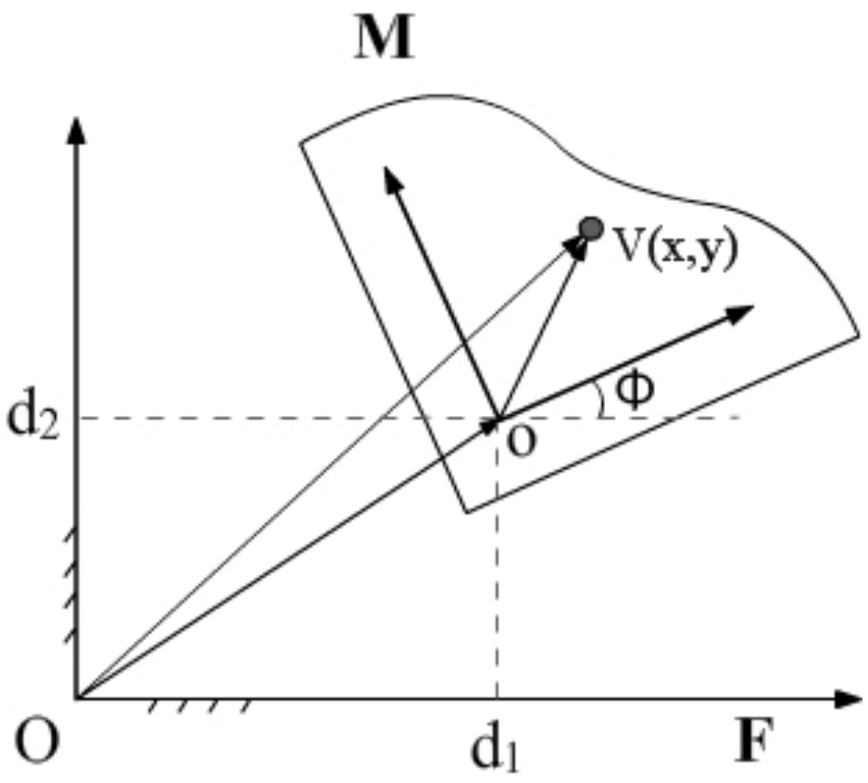
- Homogeneous Representation of Line and Circle

$$2a_1X_1 + 2a_2X_2 + a_3X_3 = a_0(\frac{X_1^2 + X_2^2}{X_3})$$

when $a_0 = 0$ $\qquad L_1X_1 + L_2X_2 + L_3X_3 = 0,$

Review: Image Space Approach

Planar-Quaternions and -Kinematic Mapping



$$Z_1 = \frac{1}{2}(d_1 \sin\frac{\phi}{2} - d_2 \cos\frac{\phi}{2}),$$

$$Z_2 = \frac{1}{2}(d_1 \cos\frac{\phi}{2} + d_2 \sin\frac{\phi}{2}),$$

$$Z_3 = \sin\frac{\phi}{2},$$

$$Z_4 = \cos\frac{\phi}{2},$$

$$\begin{bmatrix} X \\ Y \\ 1 \end{bmatrix} = \begin{bmatrix} \cos\phi & -\sin\phi & d_1 \\ \sin\phi & \cos\phi & d_2 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ 1 \end{bmatrix} \qquad \mathrm{X} = [\mathrm{H}]\mathrm{x} \qquad L = [\overline{H}]l$$