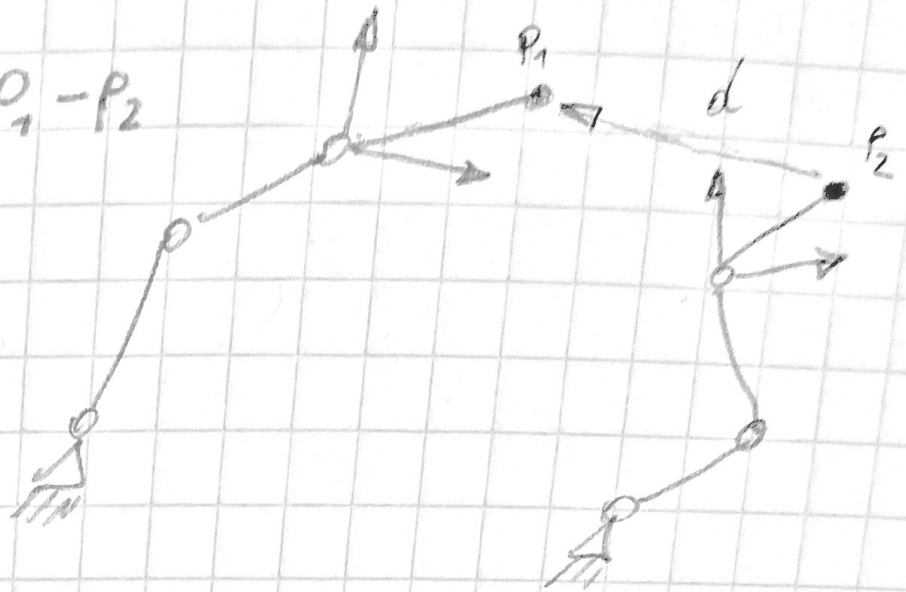


$$r = \sqrt{d^T d}, \quad d = p_1 - p_2$$

$$\dot{e} = \frac{d^T \dot{d}}{\|d\|_2}$$



$$\dot{d} = \dot{p}_1 - \dot{p}_2 = \Delta J^{p_1 p_2} \dot{q}$$

$$\dot{e} = \frac{d^T}{\|d\|_2} \Delta J^{p_1 p_2} \cdot \dot{q} \rightarrow$$

$$J^T = \frac{d^T}{\|d\|_2} \Delta J^{p_1 p_2}$$

$$J^T = \frac{d^T}{\|d\|_2} \Delta J^{p_1 p_2} + \left[\frac{\dot{d}^T}{\|d\|_2} - \frac{(d^T \dot{d}) d^T}{(d^T d)^{3/2}} \right] \Delta J^{p_1 p_2}$$