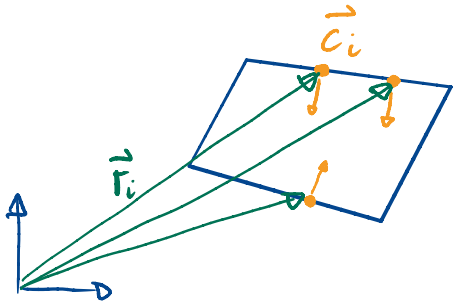
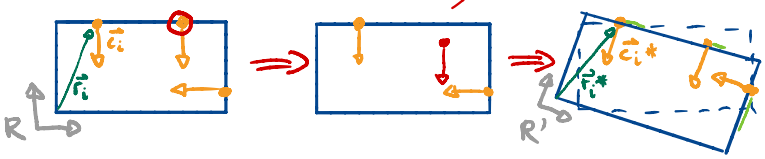
25.5.2019

Geometric constraints



infinitesimal displacement of one point ($i=a$) along surface normal: $\vec{r}_a \to \vec{r}_a + \delta_a \vec{c}_a = \vec{r}_a{}^*$



other points • stay fixed to surface and move along rigid body surface ($\perp$ to normal vectors $\vec{c}_i$).

- In a frame fixed to the rigid body: $R \to R'$,

  where vectors transform as $\vec{F} \to T(\vec{F})$

  the normal vectors $\vec{c}_i$ remain constant. $T(\vec{c}_i{}^*) = \vec{c}_i$

- also the projection of the position $\vec{r}_i$ on the normals remains constant after the displacement

$$\vec{r}_i \cdot \vec{c}_i = T(\vec{r}_i{}^*) \cdot T(\vec{c}_i{}^*)$$

$$\vec{r}_i \cdot \vec{c}_i = T(\vec{r}_i + \delta_i \vec{c}_i) \cdot T(\vec{c}_i{}^*)$$

$$= T(\vec{r}_i + \delta_i \vec{c}_i) \cdot \vec{c}_i$$

$$\Rightarrow \quad 0 = \left[T(\vec{r}_i + \delta_i \vec{c}_i) - \vec{r}_i \right] \cdot \vec{c}_i \qquad \forall\, i$$

Solve for T.