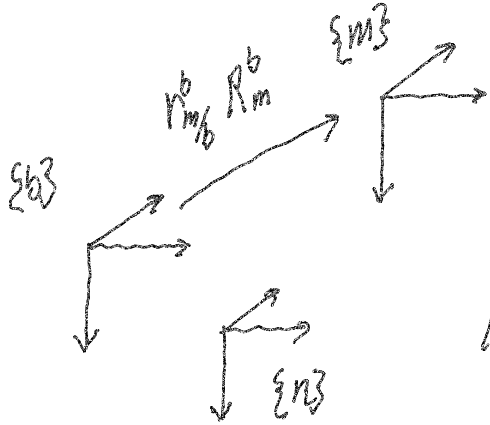

$$r^b_{m/b} = [t_x \; t_y \; t_z]^T$$

$$R^b_m = R_x(\varphi) R_y(\theta) R_z(\psi)$$

Kinematics

$$r^n_{m/n} = r^n_{b/n} + R^n_b r^b_{m/b} \qquad \dot{r}^n_{m/n} = R^n_b R^b_m \dot{r}^m_{m/n}$$

$$\dot{r}^n_{m/n} = R^n_b S(\omega^b_{b/n}) r^b_{m/b} \rightarrow \dot{r}^n_{b/n} = 0$$

$$\ddot{r}^n_{m/n} = R^n_b S^2(\omega^b_{b/n}) r^b_{m/b} + R^n_b S(\dot{\omega}^b_{b/n}) r^b_{m/b} \rightarrow \dot{r}^b_{m/b} = 0$$

$$\omega^b_{b/n} = R^b_m \omega^m_{m/n} \rightarrow \omega^m_{m/n} = R^{bT}_m \omega^b_{b/n}$$

Orientation

$$e = \omega^b_{b/n} - R^b_m(\theta_{bm})\,\omega^m_{m/n} \qquad \theta_{bm} = \begin{bmatrix} \phi \\ \theta \\ \psi \end{bmatrix}$$

$$\min_{\theta_{bm}} \sum_{i=1}^{N} e_i^T e_i$$

Position

$$e = R^b_m \dot{r}^m_{m/n} - S(\omega^b_{b/n})\, r^b_{m/b}$$

$$\min_{r^b_{m/b}} \sum_{i=1}^{N} e_i^T e_i$$