

# Mapping KSE solution to $M/SO(2)$ - Predrag's way

$$\dot{a} = v(a), \quad a = (a_1, \dots, a_n) \in \mathbb{C}^n$$

$$\tau_{\ell/L} a_k = e^{ik \frac{2\pi \ell}{L}} a_k$$

$$t_k = \left. \frac{\partial}{\partial \ell} \tau_{\ell/L} a_k \right|_{\ell=0} = ik \frac{2\pi}{L} a_k, \quad t = (t_1, \dots, t_n) \in \mathbb{C}^n$$

$$da = da_{||} + da_{\perp}, \quad t \cdot da = t \cdot da_{||} + t \cdot da_{\perp} \stackrel{0}{=} t \cdot da_{||}$$

$$da_{||} = d\ell \cdot t \Rightarrow t \cdot da_{||} = d\ell |t|^2 \Rightarrow d\ell = \frac{t \cdot da_{||}}{|t|^2} = \frac{t \cdot da}{|t|^2}$$

$$\boxed{\frac{d\ell}{dt} = \frac{t \cdot v}{|t|^2}}$$

Here's why it's not going to work:

