I Dynamics

$$\boldsymbol{\nu} = \mathbf{K}^{-1}\Psi$$

AD tools once: $\dfrac{\partial \boldsymbol{\nu}}{\partial \mathbf{q}}$ $\mathcal{O}(n^2)$

II mRNEAc DDP

$$\text{tmp} = \frac{\partial}{\partial \mathbf{q}} \text{mRNEAc}\left(\mathbf{q}, \dot{\mathbf{q}}, \ddot{\mathbf{q}}, \mathbf{a}_g, \boldsymbol{\lambda}, \boldsymbol{\xi}_{\boldsymbol{\tau}}, \boldsymbol{\pi}\right) \quad \mathcal{O}(n)$$

$$\mathbf{T}_1 = \frac{\partial}{\partial \mathbf{q}}\left[\text{tmp}\right] \quad \mathcal{O}(n^2)$$

$$\mathbf{T}_2 = \frac{\partial}{\partial \mathbf{q}} \text{mRNEAc}\left(\mathbf{q}, 0, \frac{\partial \ddot{\mathbf{q}}}{\partial \mathbf{q}}, 0, \frac{\partial \boldsymbol{\lambda}}{\partial \mathbf{q}}, \boldsymbol{\xi}_{\boldsymbol{\tau}}, \boldsymbol{\pi}\right) \quad \mathcal{O}(n^2)$$

$$\boldsymbol{\gamma}^\top \frac{\partial^2 \boldsymbol{\nu}}{\partial \mathbf{q}^2} = \mathsf{T}_1 + \mathsf{T}_2 + \mathsf{T}_2^\top$$