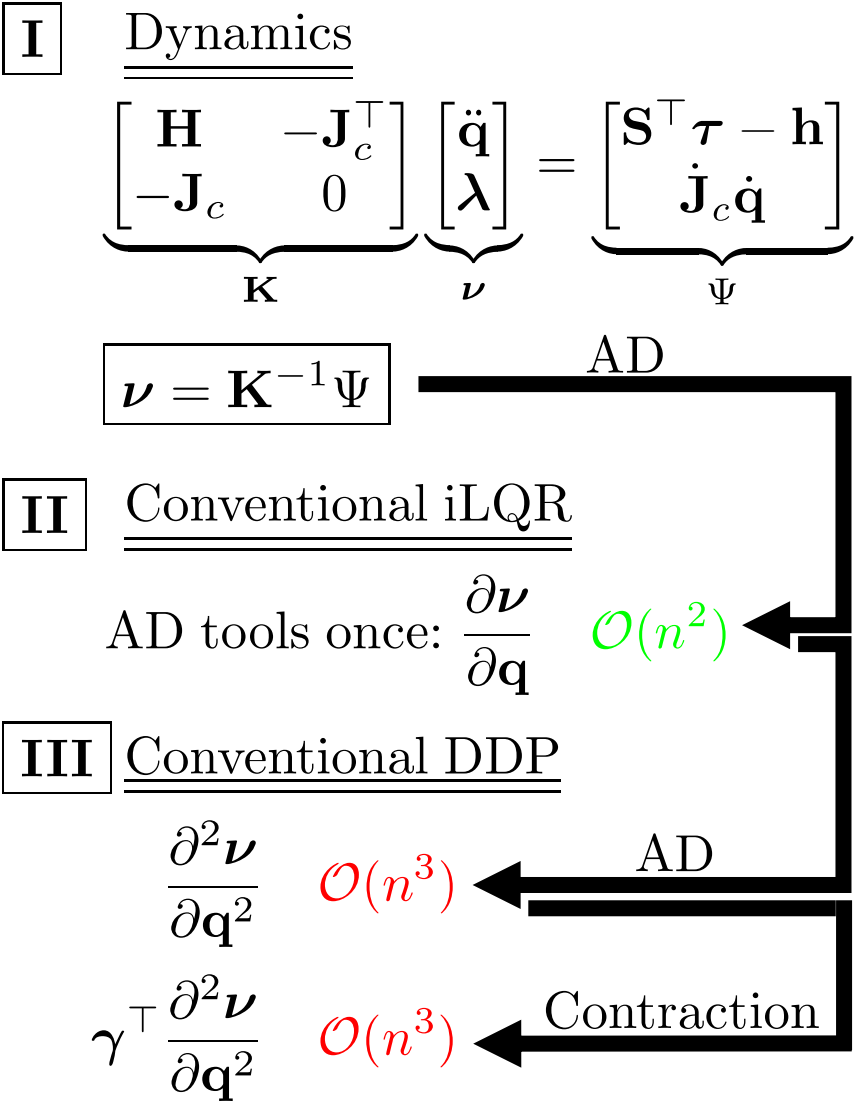
I
Dynamics
$\underbrace{\begin{bmatrix} \mathbf{H} & -\mathbf{J}_c^\top \\ -\mathbf{J}_c & 0 \end{bmatrix}}_{\mathbf{K}} \underbrace{\begin{bmatrix} \ddot{\mathbf{q}} \\ \boldsymbol{\lambda} \end{bmatrix}}_{\boldsymbol{\nu}} = \underbrace{\begin{bmatrix} \mathbf{S}^\top \boldsymbol{\tau} - \mathbf{h} \\ \dot{\mathbf{J}}_c \dot{\mathbf{q}} \end{bmatrix}}_{\Psi}$
$\boldsymbol{\nu} = \mathbf{K}^{-1}\Psi$
AD
II
Conventional iLQR
AD tools once: $\dfrac{\partial \boldsymbol{\nu}}{\partial \mathbf{q}}$
$\mathcal{O}(n^2)$
III
Conventional DDP
$\dfrac{\partial^2 \boldsymbol{\nu}}{\partial \mathbf{q}^2}$
$\mathcal{O}(n^3)$
AD
$\boldsymbol{\gamma}^\top \dfrac{\partial^2 \boldsymbol{\nu}}{\partial \mathbf{q}^2}$
$\mathcal{O}(n^3)$
Contraction