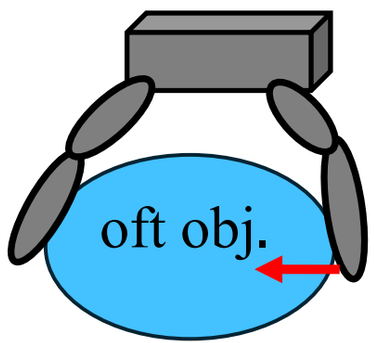
Initial Conditions

$\boldsymbol{x}_0 \leftarrow$ quintic func. $(x_{\text{limit}})$

$\boldsymbol{f}_0 \leftarrow$ contact soft obj. $(\boldsymbol{x}_0)$

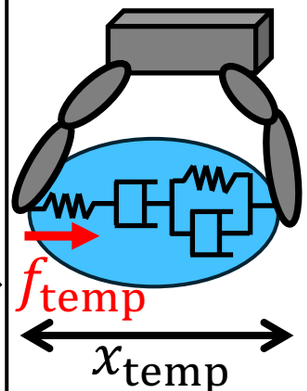
Gripper




**noise**

**p**

Orthogonal Matrix Generation ; **Q**




$\boldsymbol{x}_{\text{temp}} \leftarrow$ quintic func. $((x_{\text{limit}} = 1)$

$\boldsymbol{f}_{\text{temp}} \leftarrow (\mathbf{p}, \boldsymbol{x}_{\text{temp}})$

$M_{\text{temp}} \leftarrow (\mathbf{p}$ to $\boldsymbol{x}_{\text{temp}}, \boldsymbol{f}_{\text{temp}})$

$\mathbf{Q} \leftarrow$ qr decomposition$(\mathbf{M}_{\text{temp}})$

Boundary Conditions

$\boldsymbol{x}(0) = 0$

$\dot{\boldsymbol{x}}(0) = 0$

$\ddot{\boldsymbol{x}}(0) = 0$

$\boldsymbol{x}(\text{end}) = x_{\text{limit}}$

$\dot{\boldsymbol{x}}(\text{end}) = 0$

**Q**

Diagonal Matrix Generation ; **R**

$$O(\gamma) \gg \frac{O(\mathbf{noise})}{O(\mathbf{p})} \quad \mathbf{R} \leftarrow \sqrt{\gamma}\, I_{4\times 4}$$

$R$

$\mathbf{M}_{\text{v}} \leftarrow \mathbf{Q}\,\mathbf{R}$

$\boldsymbol{x} \leftarrow$ (Column 1 of $\mathbf{M}_{\text{v}}$)

$\boldsymbol{x}$