

$$\begin{aligned}
 \diamond v'_k &= \boxed{\Gamma^+[v_k; \zeta_v]} \equiv \boxed{v_k \odot \exp\left(\frac{\varepsilon_v^k}{2} \boxed{s_v^k(\zeta_{v_k})}\right)} - \frac{\varepsilon_v^k}{2} \left[ \boxed{\partial_x S(x_k) \odot \exp\left(\varepsilon_v^k \boxed{q_v^k(\zeta_{v_k})}\right)} + \boxed{t_v^k(\zeta_{v_k})} \right]
 \end{aligned}$$

$v$  scaling
force scaling
translation

$$\begin{aligned}
 \diamond x'_k &= \boxed{m^k} \odot x_k + \boxed{\bar{m}^k} \odot \boxed{\Lambda^+[\bar{x}_k; \zeta_{\bar{x}]}]} \equiv \boxed{x_k \odot \exp\left(\varepsilon_x^k \boxed{s_x^k(\zeta_{x_k})}\right)} + \varepsilon_x^k \left[ \boxed{v'_k \odot \exp\left(\varepsilon_x^k \boxed{q_x^k(\zeta_{x_k})}\right)} + \boxed{t_x^k(\zeta_{x_k})} \right]
 \end{aligned}$$

$x$  scaling
 $v$  scaling
translation