

$$\begin{aligned}
\Gamma^+[\mathbf{v}_k; \zeta_{\mathbf{v}}] &\equiv \boxed{\mathbf{v}_k \odot \exp\left(\frac{\varepsilon_{\mathbf{v}}^k}{2} s_{\mathbf{v}}^k(\zeta_{\mathbf{v}_k})\right)}_{\text{v scaling}} - \frac{\varepsilon_{\mathbf{v}}^k}{2} \left[\partial_x S(x_k) \odot \exp\left(\varepsilon_{\mathbf{v}}^k q_{\mathbf{v}}^k(\zeta_{\mathbf{v}_k})\right) \right]_{\text{force scaling}} + \boxed{t_{\mathbf{v}}^k(\zeta_{\mathbf{v}_k})}_{\text{translation}} \\
\Lambda^+[\bar{\mathbf{x}}_k; \zeta_{\bar{\mathbf{x}}_k}] &\equiv \boxed{\bar{\mathbf{x}}_k \odot \exp\left(\varepsilon_{\bar{\mathbf{x}}}^k s_{\bar{\mathbf{x}}}^k(\zeta_{\bar{\mathbf{x}}_k})\right)}_{\text{x scaling}} + \varepsilon_{\bar{\mathbf{x}}}^k \left[v'_k \odot \exp\left(\varepsilon_{\bar{\mathbf{x}}}^k q_{\bar{\mathbf{x}}}^k(\zeta_{\bar{\mathbf{x}}_k})\right) \right]_{\text{v scaling}} + \boxed{t_{\bar{\mathbf{x}}}^k(\zeta_{\bar{\mathbf{x}}_k})}_{\text{translation}}
\end{aligned}$$