$$\hat{g}\,(x) = \Phi\left(g\Phi^{-1}x\right): \quad \hat{g}\,(\Phi x) = \Phi\,(gx)$$

$$\hat{\gamma}\,(x) = \Phi'\left(\Phi^{-1}x\right)\gamma\left(\Phi^{-1}x\right): \quad \hat{\gamma}\,(\Phi x) = \Phi'\,(x)\,\gamma x$$

$$\hat{\gamma}_w\,(x) = 2w\overset{*}{u}x + \alpha\underbrace{w ⧗ u + u ⧗ w}x \Longrightarrow \hat{\underline{\varrho}}_w = 2\,\partial_{w\overset{*}{u}x} + \alpha\underbrace{w ⧗ u + u ⧗ w}\,\partial_x$$

$$\gamma_w\,(u) = 2w\overset{*}{u}u = 2\,w_1 + w_{1/2} = \underbrace{w_1 - \overset{*}{w}_1 + w_{1/2}}_{\in T_u(S_1)} + \underbrace{w_1 + \overset{*}{w}_1}_{\in X_u^1} = w_1 - \overset{*}{w}_1 + w_{1/2} + \underbrace{w ⧗ u + u ⧗ w}u$$

$$\partial_\varepsilon\,(t_\varepsilon u_\varepsilon) = \dot{t}\,u + t\,\dot{u} \in T_{tu}\left(Z_\ell\right)$$

$$\gamma_w\,(tu) = t\underbrace{w_1 - \overset{*}{w}_1 + w_{1/2}} + t\underbrace{w ⧗ u + u ⧗ w}u$$

$$\dot{u} = w_1 - \overset{*}{w}_1 + w_{1/2}$$

$$\dot{t} = t\underbrace{w ⧗ u + u ⧗ w}$$

$$\Phi\,(tu) = t^{1+\alpha}u$$

$$\Phi'\,(tu)\,\underbrace{\dot{t}u + t\dot{u}} = \partial_\varepsilon\Phi\,(t_\varepsilon u_\varepsilon) = \partial_\varepsilon\,\underbrace{t_\varepsilon^{1+\alpha}u_\varepsilon} = (1+\alpha)\,t^\alpha\,\dot{t}\,u + t^{1+\alpha}\,\dot{u} \in T_{t^{1+\alpha}u}\left(Z_\ell\right)$$

$$\hat{\gamma}_w\left(t^{1+\alpha}u\right) = \hat{\gamma}_w\,(\Phi\,(tu)) = \Phi'\,(tu)\,\gamma_w\,(tu) = (1+\alpha)\,t^\alpha t\underbrace{w ⧗ u + u ⧗ w}u + t^{1+\alpha}\underbrace{w_1 - \overset{*}{w}_1 + w_{1/2}}$$

$$= (1+\alpha)\,t^{1+\alpha}\underbrace{w_1 + \overset{*}{w}_1} + t^{1+\alpha}\underbrace{w_1 - \overset{*}{w}_1 + w_{1/2}} = t^{1+\alpha}\left((2+\alpha)\,w_1 + \alpha\overset{*}{w}_1 + w_{1/2}\right)$$

$$\hat{\gamma}_w\,(tu) = t\left((2+\alpha)\,w_1 + \alpha\overset{*}{w}_1 + w_{1/2}\right) = t\left(2w_1 + w_{1/2} + \alpha\underbrace{w_1 + \overset{*}{w}_1}\right) = t\left(2w\overset{*}{u}u + \alpha\underbrace{w ⧗ u + u ⧗ w}u\right)$$