

$$\mathbb{T} \xrightarrow{\left\{ \begin{array}{c} \neg \\ \vdash \end{array} \right\}} \mathbb{T} \otimes \mathbb{C} \bigtriangleup_{\ell/r} \mathbb{H}$$

$$\left\{ \begin{array}{l} \text{left opt} \\ \text{right opt} \end{array} \right.$$

$$\mathbb{C} \bigtriangleup_{\ell/r} \mathbb{H} \xrightarrow[\text{bi-falt}]{\left\{ \begin{array}{c} \neg \\ \vdash \end{array} \right\}} \mathbb{C} \bigtriangleup_{\ell/r} \mathbb{H} \otimes \mathbb{C} \bigtriangleup_{\ell/r} \mathbb{H}$$

$$\Rightarrow \mathbb{C} \bigtriangleup^{\neg \otimes 1} = \mathbb{C} \bigtriangleup^{\neg \otimes \neg}$$

$$\mathbb{C} \bigtriangleup^{\vdash \otimes 1} = \mathbb{C} \bigtriangleup^{\vdash \otimes \vdash}$$

$$\begin{array}{ccc} \mathbb{T} & \xrightarrow{\left\{ \begin{array}{c} \neg \\ \vdash \end{array} \right\}} & \mathbb{T} \otimes \mathbb{C} \bigtriangleup_{\ell/r} \mathbb{H} \\ \downarrow \left\{ \begin{array}{c} \neg \\ \vdash \end{array} \right\} & & \downarrow \left\{ \begin{array}{c} \neg \otimes \iota \\ \vdash \otimes \iota \end{array} \right\} \\ \mathbb{T} \otimes \mathbb{C} \bigtriangleup_{\ell/r} \mathbb{H} & \xrightarrow{\left\{ \begin{array}{c} \iota \otimes \neg \\ \iota \otimes \vdash \end{array} \right\}} & \mathbb{T} \otimes \mathbb{C} \bigtriangleup_{\ell/r} \mathbb{H} \otimes \mathbb{C} \bigtriangleup_{\ell/r} \mathbb{H} \end{array}$$

$$\begin{array}{ccc}
 \mathbb{1} \mathbf{x} \mathbb{C} \rhd \mathfrak{h} & \xleftarrow{\delta} & \mathbb{1} \\
 \downarrow \iota \mathbf{x} \delta_G & & \downarrow \delta \\
 \mathbb{1} \mathbf{x} \mathbb{C} \rhd \mathfrak{h} \mathbf{x} \mathbb{C} \rhd \mathfrak{h} & \xleftarrow{\delta \mathbf{x} \iota_G} & \mathbb{1} \mathbf{x} \mathbb{C} \rhd \mathfrak{h}
 \end{array}$$

$$u|\gamma=\int\limits_{ds}^{\mathfrak{h}}\,^su\,^s\gamma$$

$$\mathbb{1} \mathbf{x} \mathfrak{h} \bigtriangleup \mathbb{C} \xrightarrow[\text{cog}]{\overset{\#}{\delta}} \mathbb{1}$$

$$\delta \mathbb{T} = \mathbb{T}_i \mathbf{x} u^i \Rightarrow \underbrace{\mathbb{L} \overset{\#}{\delta}}_{\mathfrak{I}} \mathbb{T} = \underbrace{\mathbb{L} \mathbb{T}_i}_{\mathfrak{I}} \underbrace{u^i}_{\mathfrak{I}} | \gamma$$

$$\text{LHS} \, = \, \underbrace{\underbrace{\mathbb{L} \mathbf{x} \mathfrak{I}}^{\#} \delta}_{\mathfrak{I}} \mathbb{T} = \underbrace{\mathbb{L} \mathbf{x} \mathfrak{I}}_{\mathfrak{I}} \delta \mathbb{T} = \underbrace{\mathbb{L} \mathbf{x} \mathfrak{I}}_{\mathfrak{I}} \underbrace{\mathbb{T}_i \mathbf{x} u^i}_{\mathfrak{I}} = \text{RHS}$$

$$\delta \, \mathbb{T}_i = \mathbb{T}_i^j \mathbf{x} u_j^i \Rightarrow \underbrace{\mathbb{L} \overset{\#}{\delta}}_{\mathfrak{I}} \mathbb{T}_i = \underbrace{\mathbb{L} \mathbb{T}_i^j}_{\mathfrak{I}} \underbrace{u_j^i}_{\mathfrak{I}} | \gamma$$

$$\underbrace{\iota \mathbf{x} \delta}_G \delta = \underbrace{\delta \mathbf{x} \iota}_G \delta$$

$$\mathbb{T}_i \mathbf{x} \underbrace{\delta_G u^i}_{\mathfrak{I}} = \mathbb{T}_i^j \mathbf{x} u_j^i \mathbf{x} u^i$$

$$\text{LHS} \, = \, \underbrace{\iota \mathbf{x} \delta}_G \underbrace{\mathbb{T}_i \mathbf{x} u^i}_{\mathfrak{I}} = \underbrace{\iota \mathbf{x} \delta}_G \underbrace{\delta \mathbb{T}}_{\mathfrak{I}} = \underbrace{\delta \mathbf{x} \iota}_G \underbrace{\delta \mathbb{T}}_{\mathfrak{I}} = \underbrace{\delta \mathbf{x} \iota}_G \underbrace{\mathbb{T}_i \mathbf{x} u^i}_{\mathfrak{I}} = \underbrace{\delta \mathbb{T}_i}_{\mathfrak{I}} \mathbf{x} u^i = \text{RHS}$$

$$\mathbb{L}\delta_{\gamma\mathfrak{r}}^{\sharp}=\mathbb{L}\delta_{\gamma}^{\sharp}\delta_{\mathfrak{r}}^{\sharp}$$

$$\begin{aligned} \text{LHS } \mathbb{T} &= \mathbb{L}\mathbb{T}_i\overline{u^i|\mathfrak{I}\mathfrak{r}} = \mathbb{L}\mathbb{T}_i\overline{\delta_Gu^i|\mathfrak{I}\mathfrak{X}\mathfrak{r}} = \mathbb{L}\mathfrak{X}\mathfrak{I}\mathfrak{X}\mathfrak{r}|\overline{\mathbb{T}_i\mathfrak{X}\delta_Gu^i} \\ &= \mathbb{L}\mathfrak{X}\mathfrak{I}\mathfrak{X}\mathfrak{r}|\overline{\mathbb{T}_i^j\mathfrak{X}u_j^i\mathfrak{X}u^i} = \mathbb{L}\mathbb{T}_i^j\overline{u_j^i|\mathfrak{I}u^i|\mathfrak{r}} = \overline{\mathbb{L}\delta_{\gamma}^{\sharp}\mathbb{T}_i}u^i|\mathfrak{r} = \text{RHS } \mathbb{T} \end{aligned}$$