$$b \ltimes \gamma = \frac{d}{dt} \widehat{b_t \ltimes \gamma} = \frac{d}{dt} \widehat{tb \ltimes \gamma}$$

$${}^{z}\widehat{tb \ltimes \gamma} = {}^{z+tb}\gamma \, \mathfrak{e}^{-tb\overline{tb}/2 - z\overline{tb}} = {}^{z+tb}\gamma \, \mathfrak{e}^{-t^2 b\overline{b}/2 - tz\overline{b}}$$

$$b \ltimes \gamma = \partial_b \gamma - \mu_b \gamma$$

$${}^{z}\widehat{b \ltimes \gamma} = b \, {}^{z}\underline{\gamma} - z\,\overline{b}\, {}^{z}\gamma$$

$${}^{z}\widehat{b \ltimes \gamma} = \frac{d}{dt} {}^{z}\widehat{tb \ltimes \gamma} = \frac{d}{dt} \underbrace{{}^{z+tb}\gamma \mathfrak{e}^{-t^2 b\overline{b}/2 - tz\overline{b}}}_{} = \frac{d}{dt} {}^{z+tb}\gamma + {}^{z}\gamma \frac{d}{dt} \mathfrak{e}^{-t^2 b\overline{b}/2 - tz\overline{b}} = b \, {}^{z}\underline{\gamma} - z\,\overline{b}\, {}^{z}\gamma$$

$${}^{z}\widehat{1 \ltimes \gamma} = {}^{z}\underline{\gamma} - z \, {}^{z}\gamma$$

$$\underbrace{b \ltimes \gamma}\curlywedge \mathfrak{h} + \gamma \curlywedge \underbrace{b \ltimes \mathfrak{h}} = 0$$

$$0 = \frac{d}{dt} \gamma \curlywedge \mathfrak{h} = \frac{d}{dt} \widehat{b_t \ltimes \gamma} \curlywedge \widehat{b_t \ltimes \mathfrak{h}} = \underbrace{\frac{d}{dt} \widehat{b_t \ltimes \gamma}} \curlywedge \widehat{b_0 \ltimes \mathfrak{h}} + \widehat{b_0 \ltimes \gamma} \curlywedge \underbrace{\frac{d}{dt} \widehat{b_t \ltimes \mathfrak{h}}} = \text{LHS}$$

$$\underbrace{a \ltimes} \rtimes \underbrace{b \ltimes} = b\,\overline{a} - a\,\overline{b}$$

$$\text{LHS} = \widehat{\partial_a - \mu_a} \rtimes \widehat{\partial_b - \mu_b} = \widehat{\partial_a - \mu_a}\widehat{\partial_b - \mu_b} - \widehat{\partial_b - \mu_b}\widehat{\partial_a - \mu_a}$$

$$= \overbrace{\partial_a \partial_b - \partial_b \partial_a}^{=0} + \overbrace{\mu_a \mu_b - \mu_b \mu_a}^{=0} + \overbrace{\partial_b \mu_a - \mu_a \partial_b}^{=b\overline{a}} - \overbrace{\partial_a \mu_b - \mu_b \partial_a}^{=a\overline{b}} = \text{RHS}$$

$$\mathbb{C} \times \mathbb{R} i \ni a|\sigma$$

$$\underbrace{\sigma|a} \rtimes \underbrace{\tau|b} = \underbrace{b\overline{a} - a\overline{b}}|0$$

$$\underbrace{\sigma|a}\,\gamma = \sigma \gamma + a \ltimes \gamma$$

$$\underbrace{\sigma|a} = \sigma \mathfrak{i} + a \ltimes$$

$$\underbrace{\sigma|a} \rtimes \underbrace{\tau|b} = \underbrace{b\bar{a} - a\bar{b}}|0$$

$$\underbrace{\sigma|a} \rtimes \underbrace{\tau|b} = \underbrace{\sigma\mathbf{i} + a\!\bowtie} \rtimes \underbrace{\tau\mathbf{i} + b\!\bowtie} = \underbrace{a\!\bowtie} \rtimes \underbrace{b\!\bowtie} = b\,\bar{a} - a\,\bar{b}$$