

$$\begin{bmatrix} \alpha & b & 0 \\ c & d & -\bar{b} \\ 0 & -\bar{c} & -\alpha \end{bmatrix} \begin{bmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{bmatrix} + \begin{bmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{bmatrix} \begin{bmatrix} \alpha & b & 0 \\ c & d & -\bar{b} \\ 0 & -\bar{c} & -\alpha \end{bmatrix} = 0 \Leftrightarrow \begin{bmatrix} \alpha & b & 0 \\ \bar{b} & d & -\bar{b} \\ 0 & -\bar{b} & -\alpha \end{bmatrix}$$

$$z \star \begin{bmatrix} \alpha & b & 0 \\ \bar{b} & d & -\bar{b} \\ 0 & -\bar{b} & -\alpha \end{bmatrix} = \varepsilon b + zd + z \bar{b} / 2\varepsilon - \alpha z - z \bar{b} z / \varepsilon$$

$$z \bar{b} z = 2z \bar{b} z - z \bar{b} \Leftrightarrow \varepsilon = 1/\sqrt{2}$$

$$z \star \begin{bmatrix} 0 & b & 0 \\ \bar{b} & 0 & -\bar{b} \\ 0 & -\bar{b} & 0 \end{bmatrix} = \varepsilon b + z \bar{b} / 2\varepsilon - z \bar{b} z / \varepsilon = \varepsilon \left(b + z \bar{b} / 2\varepsilon^2 - z \bar{b} z / \varepsilon^2 \right) = \varepsilon \left(b - z \bar{b} z \right)$$

$$\Rightarrow z \bar{b} z = z \bar{b} z / \varepsilon^2 - z \bar{b} / 2\varepsilon^2$$

$$\begin{array}{ccc} \mathcal{O}|\mathbb{K} \times \mathbb{L} \times \mathbb{K} \cap \mathcal{U}|\mathbb{K}:\mathbb{L}:\mathbb{K} & \xrightarrow{\star} & \mathcal{U}|_o\mathbb{L} \\ \uparrow \mathbf{e} & & \uparrow \mathbf{e} \\ \mathcal{O}|\mathbb{K} \times \mathbb{L} \times \mathbb{K} \cap \mathcal{U}|\mathbb{K}:\mathbb{L}:\mathbb{K} & \xrightarrow{\star} & \mathcal{U}|_o\mathbb{L} \end{array}$$

$$\begin{array}{ccc} \mathcal{U}_{1:n:1}^{\mathbb{R}} & \xrightarrow{\star} & \mathcal{U}|_o\mathbb{C}^n \\ \uparrow \mathbf{e} & & \uparrow \mathbf{e} \\ \mathcal{U}_{1:n:1}^{\mathbb{R}} & \xrightarrow{\star} & \mathcal{U}|_o\mathbb{C}^n \end{array}$$

$$\times \begin{bmatrix} -\alpha & \mathbb{L} & 0 \\ -\kappa \mathbb{L}^* & \mathbb{T} & -\mathbb{L}^t \\ 0 & \kappa \bar{\mathbb{L}} & \alpha \end{bmatrix} = \underbrace{\mathbb{L} + \mathbb{L}\mathbb{T} - \kappa \mathbb{L}\mathbb{L}^t/2\bar{\mathbb{T}} + \mathbb{L}\alpha + \kappa \mathbb{L}\mathbb{L}\mathbb{L}^*}_{\text{}} \frac{\partial}{\partial \mathbb{L}}$$