

$$\begin{aligned} w &= u + iv \\ \exp\left(z_w \hat{\alpha} - \zeta_w^* \zeta_w / 2\right) \\ {}^\zeta \gamma &= {}^\zeta \gamma - \zeta \zeta^*/2 \mathfrak{e} \end{aligned}$$

$${}^\zeta {}_e E_\vartheta = {}^{\zeta \vartheta - \vartheta \vartheta/2 - \zeta \zeta^*/2} \mathfrak{e} : \quad {}^z \gamma = \int_{d\vartheta}^{\mathbb{C}^n} \zeta \vartheta - \vartheta \vartheta/2 - \zeta \zeta^*/2 \mathfrak{e} {}^\vartheta \gamma$$

$$\begin{aligned} {}^\zeta \gamma &= \int_{d\vartheta}^{\mathbb{C}^n} -\vartheta \vartheta^* \mathfrak{e} {}^{\zeta \vartheta} \mathfrak{e} {}^\vartheta \gamma = \int_{d\vartheta}^{\mathbb{C}^n} (\zeta - \vartheta) \vartheta^* \mathfrak{e} {}^\vartheta \gamma \\ \Rightarrow \text{LHS} &= \int_{d\vartheta}^{\mathbb{C}^n} (\zeta - \vartheta) \vartheta^* \mathfrak{e} {}^\vartheta \gamma - \zeta \zeta^*/2 \mathfrak{e} = \int_{d\vartheta}^{\mathbb{C}^n} (\zeta - \vartheta) \vartheta^* \mathfrak{e} {}^\vartheta \gamma - \vartheta \vartheta^*/2 - \zeta \zeta^*/2 \mathfrak{e} = \text{RHS} \end{aligned}$$

$${}^{\zeta_w} {}_w E_\vartheta = {}^{\zeta_w} {}_e E_{\vartheta_w} = \exp\left(\zeta_w \vartheta_w - \vartheta_w \vartheta_w/2 - \zeta_w^* \zeta_w / 2\right)$$

$$\alpha_w \overset{*}{\beta}_w = \overbrace{\alpha + \bar{\alpha} + \underline{\alpha - \bar{\alpha}} w}^* \overline{u} \overbrace{\overset{*}{\beta} + \overset{t}{\beta} + \overset{*}{w} \overset{*}{\beta} - \overset{t}{\beta}}^*$$

$$\text{LHS} = \overbrace{\alpha \underline{1+w} + \bar{\alpha} \underline{1-w}}^* - \overline{u}^{1/2} - \overline{u}^{1/2} \overbrace{\beta \underline{1+w} + \bar{\beta} \underline{1-w}}^* = \overbrace{\alpha \underline{1+w} + \bar{\alpha} \underline{1-w}}^* \overline{u} \overbrace{\underline{1+\overset{*}{w}\beta} + \underline{1-\overset{*}{w}\beta}}^* = \text{RHS}$$

$$\begin{bmatrix} \zeta_g & \bar{\zeta}_g \end{bmatrix} = \frac{1}{2} \begin{bmatrix} \zeta & \bar{\zeta} \end{bmatrix} \begin{array}{c|c} \widehat{a+d} + i \widehat{b-c} & \widehat{a-d} - i \widehat{b+c} \\ \hline \widehat{a-d} + i \widehat{b+c} & \widehat{a+d} + i \widehat{c-b} \end{array}$$

$$\begin{aligned} \begin{bmatrix} \xi_g & \eta_g \end{bmatrix} &= [\xi \ \eta] \frac{a}{c} \left| \begin{array}{c|c} b & \\ \hline d & \end{array} \right| \\ \Rightarrow \text{LHS} &= \begin{bmatrix} \xi_g & \eta_g \end{bmatrix} \frac{1}{i} \left| \begin{array}{c|c} 1 & \\ \hline -i & \end{array} \right| = [\xi \ \eta] \frac{a}{c} \left| \begin{array}{c|c} b & \\ \hline d & \end{array} \right| \frac{1}{i} \left| \begin{array}{c|c} 1 & \\ \hline -i & \end{array} \right| \frac{a}{c} \left| \begin{array}{c|c} b & \\ \hline d & \end{array} \right| \frac{1}{i} \left| \begin{array}{c|c} 1 & \\ \hline -i & \end{array} \right| = \text{RHS} \end{aligned}$$

$$\zeta_g = \frac{\zeta + \bar{\zeta}}{2} \underline{a+ib} + \frac{\zeta - \bar{\zeta}}{2} \underline{d-ic}$$

$$\frac{1}{-v} \begin{array}{c|c} 0 & u \\ \hline u & 0 \end{array} \frac{-\frac{1}{u}^{1/2}}{0} \begin{array}{c|c} 0 & -\frac{1}{u}^{1/2} \\ \hline -\frac{1}{u}^{1/2} & u \end{array} = \frac{-\frac{1}{u}^{1/2}}{-v -\frac{1}{u}^{1/2}} \begin{array}{c|c} 0 & u \\ \hline u & u \end{array} \in {}^r_2\mathbb{R}_r^\alpha$$

$$\frac{-\frac{1}{u}^{1/2}}{0} \begin{array}{c|c} -\frac{1}{u}^{1/2} v & u \\ \hline u^{1/2} & u \end{array} \frac{0}{-1} \begin{array}{c|c} 1 & 0 \\ \hline 0 & 0 \end{array} \frac{-\frac{1}{u}^{1/2}}{-v -\frac{1}{u}^{1/2}} \begin{array}{c|c} 0 & u \\ \hline u & u \end{array} = \frac{0}{-1} \begin{array}{c|c} 1 & 0 \\ \hline 0 & 0 \end{array}$$

$$[\xi_w \quad \eta_w] = [\xi \quad \eta] \frac{-\frac{1}{u}^{1/2}}{-v -\frac{1}{u}^{1/2}} \begin{array}{c|c} 0 & u \\ \hline u & u \end{array}$$

$$\frac{1}{2} \frac{1+w}{1-w} \begin{array}{c|c} 1-\bar{w} & \bar{w} \\ \hline 1+\bar{w} & 1+\bar{w} \end{array} \frac{-\frac{1}{u}^{1/2}}{0} \begin{array}{c|c} 0 & u \\ \hline u & u \end{array} \in {}^r_2\mathbb{C}_r^\alpha$$

$$\begin{array}{c|c} -\frac{1}{u}^{1/2} & 0 \\ \hline 0 & -\frac{1}{u}^{1/2} \end{array} \begin{array}{c|c} 1+w & 1-w \\ \hline 1-\bar{w} & 1+\bar{w} \end{array} \frac{0}{-1} \begin{array}{c|c} 1 & 0 \\ \hline 0 & 0 \end{array} \begin{array}{c|c} 1+w & 1-\bar{w} \\ \hline 1-w & 1+\bar{w} \end{array} \frac{-\frac{1}{u}^{1/2}}{0} \begin{array}{c|c} 0 & u \\ \hline u & u \end{array}$$

$$= 2 \frac{-\frac{1}{u}^{1/2}}{0} \begin{array}{c|c} 0 & u \\ \hline u & u \end{array} \frac{0}{-w-\bar{w}} \begin{array}{c|c} w+\bar{w} & 0 \\ \hline 0 & 0 \end{array} \frac{-\frac{1}{u}^{1/2}}{0} \begin{array}{c|c} 0 & u \\ \hline u & u \end{array} = 4 \frac{-\frac{1}{u}^{1/2}}{0} \begin{array}{c|c} 0 & u \\ \hline u & u \end{array} \frac{0}{-u} \begin{array}{c|c} u & 0 \\ \hline 0 & 0 \end{array} \frac{-\frac{1}{u}^{1/2}}{0} \begin{array}{c|c} 0 & u \\ \hline u & u \end{array} = 4 \frac{0}{-1} \begin{array}{c|c} 1 & 0 \\ \hline 0 & 0 \end{array}$$

$$2 \begin{bmatrix} \zeta_w & \bar{\zeta}_w \end{bmatrix} = \begin{bmatrix} \zeta & \bar{\zeta} \end{bmatrix} \frac{1+w}{1-w} \begin{array}{c|c} 1-\bar{w} & \bar{w} \\ \hline 1+\bar{w} & 1+\bar{w} \end{array} \frac{-\frac{1}{u}^{1/2}}{0} \begin{array}{c|c} 0 & u \\ \hline u & u \end{array}$$

$$2 \begin{bmatrix} \xi & \eta \end{bmatrix} = \begin{bmatrix} \xi & \bar{\zeta} \end{bmatrix} \frac{1}{i} \begin{array}{c|c} 1 & -i \\ \hline i & i \end{array}$$

$$\text{LHS} = [\xi_w \quad \eta_w] \frac{1}{i} \begin{array}{c|c} 1 & -i \\ \hline i & i \end{array} = [\xi \quad \eta] \frac{-\frac{1}{u}^{1/2}}{-v -\frac{1}{u}^{1/2}} \begin{array}{c|c} 0 & u \\ \hline u & u \end{array} \frac{1}{i} \begin{array}{c|c} 1 & -i \\ \hline i & i \end{array} = \begin{bmatrix} \zeta & \bar{\zeta} \end{bmatrix} \frac{1}{i} \begin{array}{c|c} -i & 0 \\ \hline i & i \end{array} \frac{-\frac{1}{u}^{1/2}}{-v -\frac{1}{u}^{1/2}} \begin{array}{c|c} 0 & u \\ \hline u & u \end{array} \frac{1}{i} \begin{array}{c|c} 1 & -i \\ \hline i & i \end{array}$$

$$= \begin{bmatrix} \zeta & \bar{\zeta} \end{bmatrix} \frac{-\frac{1}{u}^{1/2} + \frac{1}{u}^{1/2} + iv -\frac{1}{u}^{1/2}}{-\frac{1}{u}^{1/2} - \frac{1}{u}^{1/2} - iv -\frac{1}{u}^{1/2}} \begin{array}{c|c} -\frac{1}{u}^{1/2} - \frac{1}{u}^{1/2} + iv -\frac{1}{u}^{1/2} & 0 \\ \hline -\frac{1}{u}^{1/2} + \frac{1}{u}^{1/2} - iv -\frac{1}{u}^{1/2} & u \end{array} = \begin{bmatrix} \zeta & \bar{\zeta} \end{bmatrix} \frac{1+u+iv}{1-u-iv} \begin{array}{c|c} 1-u+iv & 0 \\ \hline 1+u-iv & u \end{array} = \text{RHS}$$

$$J_w = \frac{v \bar{u}^1}{\bar{u}^1} \begin{array}{c|c} -u-v \bar{u}^1 v & \\ \hline -\bar{u}^1 v & \end{array}$$

$$\begin{array}{ccc} \mathbb{C}_{2n} & \xrightarrow{-\frac{1}{u}^{1/2}} & \mathbb{C}_n \\ J_w \downarrow & & \downarrow i \\ \mathbb{C}_{2n} & \xrightarrow{-\frac{1}{u}^{1/2}} & \mathbb{C}_n \end{array}$$