$$2\frac{\partial \overset{\cdot}{\gamma}^{j}}{\partial z^{i}}=\frac{\partial \overset{\cdot}{\gamma}^{j}}{\partial x^{i}}+\frac{1}{i}\frac{\partial \overset{\cdot}{\gamma}^{j}}{\partial y^{i}}=\underbrace{\frac{\partial u^{j}}{\partial x^{i}}+i\frac{\partial v^{j}}{\partial x^{i}}}+\frac{1}{i}\underbrace{\frac{\partial u^{j}}{\partial y^{i}}+i\frac{\partial v^{j}}{\partial y^{i}}}=\overbrace{\frac{\partial u^{j}}{\partial x^{i}}+\frac{\partial v^{j}}{\partial y^{i}}}+i\overbrace{\frac{\partial v^{j}}{\partial x^{i}}-\frac{\partial u^{j}}{\partial y^{i}}}$$

$$2\frac{\partial \overset{\cdot}{\gamma}^{j}}{\partial \bar{z}^{i}}=\frac{\partial \overset{\cdot}{\gamma}^{j}}{\partial x^{i}}-\frac{1}{i}\frac{\partial \overset{\cdot}{\gamma}^{j}}{\partial y^{i}}=\underbrace{\frac{\partial u^{j}}{\partial x^{i}}+i\frac{\partial v^{j}}{\partial x^{i}}}-\frac{1}{i}\underbrace{\frac{\partial u^{j}}{\partial y^{i}}+i\frac{\partial v^{j}}{\partial y^{i}}}=\overbrace{\frac{\partial u^{j}}{\partial x^{i}}-\frac{\partial v^{j}}{\partial y^{i}}}+i\overbrace{\frac{\partial v^{j}}{\partial x^{i}}+\frac{\partial u^{j}}{\partial y^{i}}}$$

$$\frac{\partial\left(\overset{\cdot}{\gamma}:\overset{\cdot}{\bar{\gamma}}\right)}{\partial\left(z^{\cdot}:\bar{z}^{\cdot}\right)}:=\frac{\partial \overset{\cdot}{\gamma}^{j}/\partial z^{i}\;\middle|\;\partial \overset{\cdot}{\bar{\gamma}}^{j}/\partial z^{i}}{\partial \overset{\cdot}{\gamma}^{j}/\partial \bar{z}^{i}\;\middle|\;\partial \overset{\cdot}{\bar{\gamma}}^{j}/\partial \bar{z}^{i}}$$

$$\frac{\partial\left(u^{\cdot}:v^{\cdot}\right)}{\partial\left(x^{\cdot}:y^{\cdot}\right)}:=\frac{\partial u^{j}/\partial x^{i}\;\middle|\;\partial v^{j}/\partial x^{i}}{\partial u^{j}/\partial y^{i}\;\middle|\;\partial v^{j}/\partial y^{i}}$$

$$\frac{\partial\left(\overset{\cdot}{\gamma}:\overset{\cdot}{\bar{\gamma}}\right)}{\partial\left(z^{\cdot}:\bar{z}^{\cdot}\right)}=\frac{I_{n}\;\middle|\;I_{n}}{iI_{n}\;\middle|\;-iI_{n}}^{-1}\;\frac{\partial\left(u^{\cdot}:v^{\cdot}\right)}{\partial\left(x^{\cdot}:y^{\cdot}\right)}\;\frac{I_{m}\;\middle|\;I_{m}}{iI_{m}\;\middle|\;-iI_{m}}$$

$$\frac{\partial \overset{\cdot}{\gamma}^{j}/\partial z^{i}\;\middle|\;\partial \overset{\cdot}{\bar{\gamma}}^{j}/\partial z^{i}}{\partial \overset{\cdot}{\gamma}^{j}/\partial \bar{z}^{i}\;\middle|\;\partial \overset{\cdot}{\bar{\gamma}}^{j}/\partial \bar{z}^{i}}=\frac{I_{n}\;\middle|\;I_{n}}{iI_{n}\;\middle|\;-iI_{n}}^{-1}\;\frac{\partial u^{j}/\partial x^{i}\;\middle|\;\partial v^{j}/\partial x^{i}}{\partial u^{j}/\partial y^{i}\;\middle|\;\partial v^{j}/\partial y^{i}}\;\frac{I_{m}\;\middle|\;I_{m}}{iI_{m}\;\middle|\;-iI_{m}}$$

$$=\frac{I_{n}\;\middle|\;-iI_{n}}{I_{n}\;\middle|\;iI_{n}}/\sqrt{2}\,\frac{\partial u^{j}/\partial x^{i}\;\middle|\;\partial v^{j}/\partial x^{i}}{\partial u^{j}/\partial y^{i}\;\middle|\;\partial v^{j}/\partial y^{i}}\;\underset{\text{unitary}}{\frac{I_{m}\;\middle|\;I_{m}}{iI_{m}\;\middle|\;-iI_{m}}}/\sqrt{2}$$

$$\frac{I_{n}\;\middle|\;I_{n}}{iI_{n}\;\middle|\;-iI_{n}}\;\frac{\dfrac{\partial \overset{\cdot}{\gamma}^{j}}{\partial z^{i}}\;\middle|\;\dfrac{\partial \overset{\cdot}{\bar{\gamma}}^{j}}{\partial z^{i}}}{\dfrac{\partial \overset{\cdot}{\gamma}^{j}}{\partial \bar{z}^{i}}\;\middle|\;\dfrac{\partial \overset{\cdot}{\bar{\gamma}}^{j}}{\partial \bar{z}^{i}}}=\frac{\dfrac{\partial \overset{\cdot}{\gamma}^{j}}{\partial z^{i}}+\dfrac{\partial \overset{\cdot}{\gamma}^{j}}{\partial \bar{z}^{i}}\;\middle|\;\dfrac{\partial \overset{\cdot}{\bar{\gamma}}^{j}}{\partial z^{i}}+\dfrac{\partial \overset{\cdot}{\bar{\gamma}}^{j}}{\partial \bar{z}^{i}}}{i\dfrac{\partial \overset{\cdot}{\gamma}^{j}}{\partial z^{i}}-i\dfrac{\partial \overset{\cdot}{\gamma}^{j}}{\partial \bar{z}^{i}}\;\middle|\;i\dfrac{\partial \overset{\cdot}{\bar{\gamma}}^{j}}{\partial z^{i}}-i\dfrac{\partial \overset{\cdot}{\bar{\gamma}}^{j}}{\partial \bar{z}^{i}}}=\frac{\dfrac{\partial \overset{\cdot}{\gamma}^{j}}{\partial x^{i}}\;\middle|\;\dfrac{\partial \overset{\cdot}{\bar{\gamma}}^{j}}{\partial x^{i}}}{\dfrac{\partial \overset{\cdot}{\gamma}^{j}}{\partial y^{i}}\;\middle|\;\dfrac{\partial \overset{\cdot}{\bar{\gamma}}^{j}}{\partial y^{i}}}$$

$$=\frac{\dfrac{\partial u^{j}}{\partial x^{i}}+i\dfrac{\partial v^{j}}{\partial x^{i}}\;\middle|\;\dfrac{\partial u^{j}}{\partial x^{i}}-i\dfrac{\partial v^{j}}{\partial x^{i}}}{\dfrac{\partial u^{j}}{\partial y^{i}}+i\dfrac{\partial v^{j}}{\partial y^{i}}\;\middle|\;\dfrac{\partial u^{j}}{\partial y^{i}}-i\dfrac{\partial v^{j}}{\partial y^{i}}}=\frac{\dfrac{\partial u^{j}}{\partial x^{i}}\;\middle|\;\dfrac{\partial v^{j}}{\partial x^{i}}}{\dfrac{\partial u^{j}}{\partial y^{i}}\;\middle|\;\dfrac{\partial v^{j}}{\partial y^{i}}}\;\frac{I_{m}\;\middle|\;I_{m}}{iI_{m}\;\middle|\;-iI_{m}}$$

$$\partial_{z}\,\overset{\cdot}{\gamma}+\partial_{z^{*}}\,\overset{\cdot}{\gamma}=\partial_{x}\,\overset{\cdot}{\gamma}\,\partial_{z}\,\overset{\cdot}{\gamma}-\partial_{z^{*}}\,\overset{\cdot}{\gamma}=-i\,\partial_{y}\,\overset{\cdot}{\gamma}$$

$${}^{x^{\cdot}+iy^{\cdot}}\overset{\cdot}{\gamma}^{j}={}^{x^{\cdot}:y^{\cdot}}u^{j}+i\;{}^{x^{\cdot}:y^{\cdot}}v^{j}:{}^{u^{\cdot}+iv^{\cdot}}\overset{\cdot}{\eta}^{k}={}^{u^{\cdot}:v^{\cdot}}p^{k}+i\;{}^{u^{\cdot}:v^{\cdot}}q^{k}$$

$$\Longrightarrow{}^{x^{\cdot}+iy^{\cdot}}\overbrace{\gamma\eta}^{k}={}^{x^{\cdot}:y^{\cdot}}p^{k}+i\;{}^{x^{\cdot}:y^{\cdot}}q^{k}$$

$$\frac{\partial \widehat{\mathfrak{y}\mathfrak{h}}^{k}}{\partial z^{i}} = \frac{\partial \mathfrak{y}^{j}}{\partial z^{i}} \frac{\partial \mathfrak{h}^{k}}{\partial w^{j}} + \frac{\partial \bar{\mathfrak{y}}^{j}}{\partial z^{i}} \frac{\partial \mathfrak{h}^{k}}{\partial \bar{w}^{j}}$$

$$\frac{\partial \widehat{\mathfrak{y}\mathfrak{h}}^{k}}{\partial \bar{z}^{i}} = \frac{\partial \mathfrak{y}^{j}}{\partial \bar{z}^{i}} \frac{\partial \mathfrak{h}^{k}}{\partial w^{j}} + \frac{\partial \bar{\mathfrak{y}}^{j}}{\partial \bar{z}^{i}} \frac{\partial \mathfrak{h}^{k}}{\partial \bar{w}^{j}}$$

$$\frac{\partial \left(\widehat{\mathfrak{y}\mathfrak{h}}^{\cdot} : \overline{\widehat{\mathfrak{y}\mathfrak{h}}}^{\cdot} \right)}{\partial \left(z^{\cdot} : \bar{z}^{\cdot} \right)} = \frac{\partial \left(\mathfrak{y}^{\cdot} : \bar{\mathfrak{y}}^{\cdot} \right)}{\partial \left(z^{\cdot} : \bar{z}^{\cdot} \right)} \frac{\partial \left(\mathfrak{h}^{\cdot} : \bar{\mathfrak{h}}^{\cdot} \right)}{\partial \left(w^{\cdot} : \bar{w}^{\cdot} \right)}$$

$$\text{RHS} = \frac{I_n \;\middle|\; I_n}{iI_n \;\middle|\; -iI_n}^{-1} \frac{\partial \left(u^{\cdot} : v^{\cdot} \right)}{\partial \left(x^{\cdot} : y^{\cdot} \right)} \frac{I_m \;\middle|\; I_m}{iI_m \;\middle|\; -iI_m} \frac{I_m \;\middle|\; I_m}{iI_m \;\middle|\; -iI_m}^{-1} \frac{\partial \left(p^{\cdot} : q^{\cdot} \right)}{\partial \left(u^{\cdot} : v^{\cdot} \right)} \frac{I_\ell \;\middle|\; I_\ell}{iI_\ell \;\middle|\; -iI_\ell}$$

$$= \frac{I_n \;\middle|\; I_n}{iI_n \;\middle|\; -iI_n}^{-1} \frac{\partial \left(u^{\cdot} : v^{\cdot} \right)}{\partial \left(x^{\cdot} : y^{\cdot} \right)} \frac{\partial \left(p^{\cdot} : q^{\cdot} \right)}{\partial \left(u^{\cdot} : v^{\cdot} \right)} \frac{I_\ell \;\middle|\; I_\ell}{iI_\ell \;\middle|\; -iI_\ell} = \frac{I_n \;\middle|\; I_n}{iI_n \;\middle|\; -iI_n}^{-1} \frac{\partial \left(p^{\cdot} : q^{\cdot} \right)}{\partial \left(x^{\cdot} : y^{\cdot} \right)} \frac{I_\ell \;\middle|\; I_\ell}{iI_\ell \;\middle|\; -iI_\ell} = \text{LHS}$$