$$ {}^{z}U_{w} = {}^{z}B_{w}^{-\,1/2}\, \mathfrak{t}_{-w}^{*}\, \mathfrak{t}_{-z}\, {}^{z}B_{w}^{-\,1/2} = \left.\begin{array}{c|c} z\overset{*}{w} & -z \\ \hline -\overset{*}{w} & \underset{-1}{\underbrace{1+\overset{*}{w}z}}\,\underset{-1}{\underbrace{\overset{*}{w}z}} \end{array}\right. \in G^{\mathbb{C}} $$

$$ {}^{z}U_{w}^{-1} = \left.\begin{array}{c|c} \overbrace{z\overset{*}{w}}^{-1}\overbrace{1+z\overset{*}{w}} & z \\ \hline \overset{*}{w} & \overset{*}{w}z \end{array}\right. $$

$$ \not{z} \underset{\overline{9.6}}{\overset{\mathrm{LOO}}{=}} \mathfrak{t}_{z}^{*}\, {}^{z}B_{z}^{1/2}\, \mathfrak{t}_{z} = \left.\begin{array}{c|c} 1 & 0 \\ \hline \overset{*}{z} & 1 \end{array}\right. \left.\begin{array}{c|c} \overbrace{z\overset{*}{z}}^{-\,1/2} & 0 \\ \hline 0 & \underset{1/2}{\underbrace{\overset{*}{z}z}} \end{array}\right. \left.\begin{array}{c|c} 1 & z \\ \hline 0 & 1 \end{array}\right. = \left.\begin{array}{c|c} \overbrace{z\overset{*}{z}}^{-\,1/2} & \overbrace{z\overset{*}{z}}^{-\,1/2}\, z \\ \hline \overset{*}{z}\,\underset{-\,1/2}{\underbrace{z\overset{*}{z}}} & \underset{-\,1/2}{\underbrace{\overset{*}{z}z}} \end{array}\right. $$

$$ {}^{0}U_{\not{z}} = \mathfrak{t}_{0}\not{z}\,\mathfrak{t}_{z}^{-1} = \mathfrak{t}_{z}^{*}\, {}^{z}B_{z}^{1/2} = \left.\begin{array}{c|c} 1 & 0 \\ \hline \overset{*}{z} & 1 \end{array}\right. \left.\begin{array}{c|c} \overbrace{z\overset{*}{z}}^{-\,1/2} & 0 \\ \hline 0 & \underset{1/2}{\underbrace{\overset{*}{z}z}} \end{array}\right. = \left.\begin{array}{c|c} \overbrace{z\overset{*}{z}}^{-\,1/2} & 0 \\ \hline \overset{*}{z}\,\underset{-\,1/2}{\underbrace{z\overset{*}{z}}} & \underset{1/2}{\underbrace{\overset{*}{z}z}} \end{array}\right. $$

$$ {}^{0}\overline{U}_{\not{z}}^{1} = {}^{z}B_{z}^{-\,1/2}\, \overset{*}{\mathfrak{t}}_{-z} = \left.\begin{array}{c|c} \overbrace{z\overset{*}{z}}^{1/2} & 0 \\ \hline 0 & \underset{-\,1/2}{\underbrace{\overset{*}{z}z}} \end{array}\right. \left.\begin{array}{c|c} 1 & 0 \\ \hline -\overset{*}{z} & 1 \end{array}\right. = \left.\begin{array}{c|c} \overbrace{z\overset{*}{z}}^{1/2} & 0 \\ \hline -\overset{*}{z}\,\underset{-\,1/2}{\underbrace{z\overset{*}{z}}} & \underset{-\,1/2}{\underbrace{\overset{*}{z}z}} \end{array}\right. $$

$$ {}^{z}U_{z} = {}^{0}\overline{U}_{\not{z}}^{1}\, {}^{0}\overline{U}_{\not{z}}^{*} = {}^{z}B_{z}^{-\,1/2}\, \mathfrak{t}_{-z}^{*}\, \mathfrak{t}_{-z}\, {}^{z}B_{z}^{-\,1/2} = \left.\begin{array}{c|c|c} \overbrace{z\overset{*}{z}}^{1/2} & 0 & \overbrace{z\overset{*}{z}}^{1/2} \\ \hline -\overset{*}{z}\,\underset{-\,1/2}{\underbrace{z\overset{*}{z}}} & \underset{-\,1/2}{\underbrace{\overset{*}{z}z}} & 0 \end{array}\right. \left.\begin{array}{c|c} \overbrace{-\,z\overset{*}{z}}^{-\,1/2}\, z \\ \hline \underset{-\,1/2}{\underbrace{\overset{*}{z}z}} \end{array}\right. = \left.\begin{array}{c|c} z\overset{*}{z} & -z \\ \hline -\overset{*}{z} & \underset{-1}{\underbrace{\overset{*}{z}z}}\,\underset{}{\underbrace{1+\overset{*}{z}z}} \end{array}\right. $$

$$ \zeta\, {}^{z}U_{w} = \overbrace{z+\zeta}^{w} - 2\, z^{w} $$

$$ \zeta\, {}^{z}U_{w} + 2\, z^{w} = \overbrace{\underset{}{\underbrace{z+\zeta}}\overset{*}{w}}^{-1}\overbrace{\zeta\underset{}{\underbrace{1+\overset{*}{w}z}}\underset{-1}{\underbrace{\overset{*}{w}z}} - z}^{} + 2\underset{-1}{\underbrace{z\overset{*}{w}}}\, z = \overbrace{\underset{}{\underbrace{z+\zeta}}\overset{*}{w}}^{-1}\overbrace{\zeta\underset{}{\underbrace{1+\overset{*}{w}z}} - z\underset{}{\underbrace{\overset{*}{w}z}}}^{}\underset{-1}{\underbrace{\overset{*}{w}z}} + 2z\underset{-1}{\underbrace{\overset{*}{w}z}} $$

$$ = \overbrace{\underset{}{\underbrace{z+\zeta}}\overset{*}{w}}^{-1}\overbrace{\zeta\underset{}{\underbrace{1+\overset{*}{w}z}} - z\underset{}{\underbrace{\overset{*}{w}z}} + 2\overbrace{\underset{}{\underbrace{z+\zeta}}\overset{*}{w}z}}^{}\underset{-1}{\underbrace{\overset{*}{w}z}} = \overbrace{\underset{}{\underbrace{z+\zeta}}\overset{*}{w}}^{-1}\overbrace{\zeta + z - \underset{}{\underbrace{z+\zeta}}\overset{*}{w}}^{}\underset{-1}{\underbrace{\overset{*}{w}z}} = \overbrace{\underset{}{\underbrace{z+\zeta}}\overset{*}{w}}^{-1}\underset{}{\underbrace{\zeta + z}} = \overbrace{z+\zeta}^{w} $$

$$ {}^{\zeta}\overbrace{{}^{z}U_{w}^{|n}1}^{} = \overbrace{\underset{}{\underbrace{z+\zeta}}\overset{*}{w}}^{n}\overbrace{\underset{-1}{\underbrace{z+\zeta}}\overset{*}{w}\underset{}{\underbrace{\zeta\underset{}{\underbrace{1+\overset{*}{w}z}}\underset{-1}{\underbrace{\overset{*}{w}z}} - z}}}^{}1 $$

$$ {}^{\zeta}\overbrace{{}^{z}U_{w}^{|n}1}^{} = \overbrace{\underset{}{\underbrace{z+\zeta}}\overset{*}{w}}^{n} $$

$$ {}^{z}U_{w}^{|n}\, B_{-\omega}^{n} = B_{-\acute{\omega}}^{n} \overbrace{z\underbrace{w+\omega}_{*}}^{n} $$

$$ \acute{\omega} = \overbrace{\underbrace{w+\omega}_{*}\overset{*}{z}}^{-1}\, \omega\, \overbrace{\overset{*}{z}w}^{-1} - w^{z} $$

$$ {}^{\zeta}\mathrm{LHS} = \overbrace{\underbrace{z+\zeta}_{*}\overset{*}{w}}^{n}\ \overbrace{1+\overbrace{\underbrace{z+\zeta}_{*}\overset{*}{w}}^{-1}\zeta\overbrace{1+\overset{*}{w}z\,\overset{*}{w}z}^{-1}-z\overset{*}{\omega}}^{n} = \overbrace{\underbrace{z+\zeta}_{*}\overset{*}{w}+\zeta\overbrace{1+\overset{*}{w}z\,\overset{*}{w}z}^{-1}-z\overset{*}{\omega}}^{n} $$

$$ = \overbrace{z\overset{*}{w}-z\overset{*}{\omega}+\zeta\underbrace{1+\overset{*}{w}z\,\overbrace{\overset{*}{w}z}^{-1}\overset{*}{\omega}-\overset{*}{w}}_{*}}^{n} = \overbrace{1+\zeta\underbrace{1+\overset{*}{w}z\,\overbrace{\overset{*}{w}z}^{-1}\overset{*}{\omega}-\overset{*}{w}}_{*}\underbrace{z\overset{*}{w}-z\overset{*}{\omega}}_{-1}}^{n}\ \overbrace{z\overset{*}{w}-z\overset{*}{\omega}}^{n} $$

$$ \acute{\omega} = \overbrace{\underbrace{1+\overset{*}{w}z\,\overbrace{\overset{*}{w}z}^{-1}\overset{*}{\omega}-\overset{*}{w}}_{*}\underbrace{z\overset{*}{w}-z\overset{*}{\omega}}_{-1}}^{*} = \underbrace{w\overset{*}{z}-\omega\overset{*}{z}}_{-1}\overbrace{\omega\underbrace{\overset{*}{z}w}_{-1}\underbrace{1+\overset{*}{z}w}_{*}-w} $$

$$ = \overbrace{\underbrace{w+\omega}_{*}\overset{*}{z}}^{-1}\overbrace{\omega-w+\underbrace{\omega+w}_{*}\overset{*}{z}w}\ \overbrace{\overset{*}{z}w}^{-1} = \overbrace{\underbrace{(w+\omega)\,\overset{*}{z}\omega-w}_{*}}^{-1}\overbrace{\overset{*}{z}w}^{-1} = \overbrace{(w+\omega)\,\overset{*}{z}}^{-1}\,\omega\,\overbrace{\overset{*}{z}w}^{-1} - w^{z} $$

$$ {}^{z}U_{w}^{-1}\, B_{-\omega}^{n} = \overbrace{\underbrace{z\overset{*}{w}}_{-1}\underbrace{1+z\overset{*}{w}}_{*}+z\overset{*}{\omega}}^{n}\ B_{-\acute{\omega}}^{n} $$

$$ \acute{\omega} = \overbrace{\omega\overset{*}{z}+\underbrace{1+wz*}_{*}\underbrace{w\overset{*}{z}}_{-1}}^{-1}\ \overbrace{w+\omega\underbrace{z\overset{*}{w}}_{*}} $$