$$\text{super-ball } W = \begin{bmatrix} w \\ \eta \end{bmatrix}$$

$${\begin{array}{c|c} 1 - w\bar{w} & -\bar{\eta}w \\ \hline -\eta\bar{w} & 1 - \eta\bar{\eta} \end{array}}^{-1} = \frac{1}{1 - \bar{w}w - \bar{\eta}\eta} \begin{array}{c|c} 1 - \bar{\eta}\eta & \bar{\eta}w \\ \hline \eta\bar{w} & 1 - w\bar{w} - 2\bar{\eta}\eta \end{array}$$

$$\begin{array}{c|c} 1 - w\bar{w} & -\bar{\eta}w \\ \hline -\eta\bar{w} & 1 - \eta\bar{\eta} \end{array} \begin{array}{c|c} 1 - \bar{\eta}\eta & \bar{\eta}w \\ \hline \eta\bar{w} & 1 - w\bar{w} - 2\bar{\eta}\eta \end{array} = \begin{array}{c|c} 1 - w\bar{w} - \bar{\eta}\eta & 0 \\ \hline 0 & 1 - w\bar{w} - \bar{\eta}\eta \end{array}$$

$$s_w^\alpha = \frac{1}{1 - \bar{w}w - \bar{\eta}\eta} \begin{array}{c|c} \begin{array}{c|c} 1 - \bar{\eta}\eta & \bar{\eta}w \\ \hline \eta\bar{w} & 1 - w\bar{w} - 2\bar{\eta}\eta \end{array} \begin{array}{c|c} \alpha - w\bar{w} & -\bar{\eta}w \\ \hline -\eta\bar{w} & \alpha - \eta\bar{\eta} \end{array} & (1-\alpha) \begin{bmatrix} w \\ \eta \end{bmatrix} \\ \hline (\alpha - 1) \begin{bmatrix} \bar{w} & \bar{\eta} \end{bmatrix} & 1 - \iota\bar{v}w - \alpha\bar{\eta}\eta \end{array}$$

$$= \frac{1}{1 - \bar{w}w - \bar{\eta}\eta} \begin{array}{c|c|c} \alpha\left(1 - \bar{\eta}\eta\right) - \bar{w}w & (\alpha - 1)\, w\bar{\eta} & (1-\alpha)\, w \\ \hline (\alpha - 1)\, \eta\bar{w} & \alpha\left(1 - w\bar{w}\right) + (1 - 2\alpha)\, \bar{\eta}\eta & (1-\alpha)\, \eta \\ \hline (\alpha - 1)\, \bar{w} & (\alpha - 1)\, \bar{\eta} & 1 - \alpha\left(\bar{w}w + \bar{\eta}\eta\right) \end{array}$$

$$\det \begin{array}{c|c} 1 - z\bar{w} & -z\bar{\eta} \\ \hline -\zeta\bar{w} & 1 - \zeta\bar{\eta} \end{array} = 1 - z\,\bar{w} + \zeta\,\bar{\eta}$$