For the output feedback controller the closed-loop system is given as

$$\begin{aligned} \lambda I - (A + kBC) &= 0 \\ \lambda I - A - kBC &= 0 \\ (\lambda I - A)X_1 n_1 - kBCX_1 n_1 &= 0 \\ (\lambda I - A)X_1 n_1 + BCY_1 n_1 &= 0 \\ \begin{bmatrix} \lambda I - A & BC \end{bmatrix} \begin{bmatrix} X_1 n_1 \\ Y_1 n_1 \end{bmatrix} &= 0 \end{aligned} \tag{1}$$

Lets assume λ is unknown, then

$$\begin{aligned} X_1 n_1 &= R_{des}(1) \\ n_1 &= X_1^{-1} R_{des}(1) \end{aligned} \tag{2}$$

and

$$\begin{aligned} (\lambda I - A)X_1 &= \gamma X_1 \\ (\lambda I - \gamma I - A)X_1 &= 0 \end{aligned} \tag{3}$$