Page 2 Lecture 10 handhout example

$$S11 := 0.46 \angle 162\ ^{\circ} \qquad S12 := 0.103 \angle 45\ ^{\circ} \qquad \theta_g := 0.025 \cdot 2\ \pi \qquad lg := 0.19 \cdot 2\ \pi \qquad j := 1i$$

$$S21 := 2.774 \angle 59\ ^{\circ} \qquad S22 := 0.42 \angle -47\ ^{\circ} \qquad \theta_l := 0.236 \cdot 2\ \pi \qquad l_l := 0.187 \cdot 2\ \pi$$

$$S := \begin{bmatrix} S11 & S12 \\ S21 & S22 \end{bmatrix} \qquad S = \begin{bmatrix} -0.437 + 0.142i & 0.073 + 0.073i \\ 1.429 + 2.378i & 0.286 - 0.307i \end{bmatrix} \qquad yo := \frac{1}{50}$$

$$E := \begin{bmatrix} e^{-j \cdot \theta_g} & 0 \\ 0 & e^{-j \cdot \theta_l} \end{bmatrix} \qquad E = \begin{bmatrix} 0.988 - 0.156i & 0 \\ 0 & 0.088 - 0.996i \end{bmatrix}$$

$$S1 := E \cdot S \cdot E \qquad\qquad S1 = \begin{bmatrix} -0.372 + 0.27i & 0.068 - 0.078i \\ 2.273 - 1.59i & -0.336 + 0.252i \end{bmatrix}$$

$$s11 := -0.372 + 0.27i \qquad s12 := 0.068 - 0.078i$$

$$s21 := 2.273 - 1.59i \qquad s22 := -0.336 + 0.252i$$

$$y11 := yo \cdot \left(\frac{(1 - s11) \cdot (1 + s22) + s12 \cdot s21}{(1 + s11) \cdot (1 + s22) - s12 \cdot s21} \right) \qquad y12 := yo \cdot \left(\frac{-2 \cdot s12}{(1 + s11) \cdot (1 + s22) - s12 \cdot s21} \right)$$

$$y21 := yo \cdot \left(\frac{-2 \cdot s21}{(1 + s11) \cdot (1 + s22) - s12 \cdot s21} \right) \qquad y22 := yo \cdot \left(\frac{(1 + s11) \cdot (1 - s22) + s12 \cdot s21}{(1 + s11) \cdot (1 + s22) - s12 \cdot s21} \right)$$

$$y := \begin{bmatrix} y11 & y12 \\ y21 & y22 \end{bmatrix} \qquad\qquad Yoc := \begin{bmatrix} j \cdot \tan(lg) & 0 \\ 0 & j \cdot \tan(l_l) \end{bmatrix}$$

$$y = \begin{bmatrix} 0.01 - 0.027i & 0.002 + 0.005i \\ 0.022 + 0.157i & 0.01 - 0.025i \end{bmatrix} \qquad Yoc = \begin{bmatrix} 2.526i & 0 \\ 0 & 2.393i \end{bmatrix}$$

$$Y_{amp} := y + Yoc \qquad\qquad Y_{amp} = \begin{bmatrix} 0.01 + 2.498i & 0.002 + 0.005i \\ 0.022 + 0.157i & 0.01 + 2.368i \end{bmatrix}$$

$$ya11 := 0.01 + 2.498i \qquad ya12 := 0.002 + 0.005i \qquad ya21 := 0.022 + 0.157i \qquad ya22 := 0.01 + 2.368i$$

$$\Delta y := (ya11 + yo) \cdot (ya22 + yo) - ya12 \cdot ya21$$

$$sa11 := \frac{(yo - ya11) \cdot (yo + ya22) + ya12 \cdot ya21}{\Delta y} \qquad sa22 := \frac{(yo + ya11) \cdot (yo - ya22) + ya12 \cdot ya21}{\Delta y}$$

$$sa12 := \frac{-2 \cdot ya12 \cdot yo}{\Delta y} \qquad sa21 := \frac{-2 \cdot ya21 \cdot yo}{\Delta y}$$

$$Samp := \begin{bmatrix} sa11 & sa12 \\ sa21 & sa22 \end{bmatrix} \qquad Samp = \begin{bmatrix} -1 - 0.016i & 1.269 \cdot 10^{-5} + 3.413i \cdot 10^{-5} \\ 1.226 \cdot 10^{-4} + 0.001i & -1 - 0.017i \end{bmatrix}$$