Evaluate $[S]$ for the series load case of problem 4.11 if $Z_0 = 75\ \Omega$ and $Z = 50 - j25\ \Omega$.

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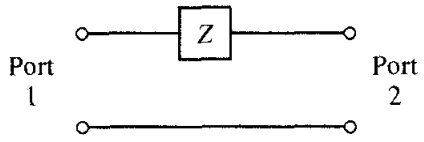
4.11 Find the scattering parameters for the series and shunt loads shown below. Show that $S_{12} = 1 - S_{11}$ for the series case, <snip>. Assume a characteristic impedance Z_0.



From problem 4.11, $[S] = \begin{bmatrix} \frac{Z}{2Z_0 + Z} & \frac{2Z_0}{2Z_0 + Z} \\ \frac{2Z_0}{2Z_0 + Z} & \frac{Z}{2Z_0 + Z} \end{bmatrix}$.

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Now,

$$[S] = \begin{bmatrix} \frac{50 - j25}{2(75) + (50 - j25)} & \frac{2(75)}{2(75) + (50 - j25)} \\ \frac{2(75)}{2(75) + (50 - j25)} & \frac{50 - j25}{2(75) + (50 - j25)} \end{bmatrix} = \begin{bmatrix} \frac{50 - j25}{200 - j25} & \frac{150}{200 - j25} \\ \frac{150}{200 - j25} & \frac{50 - j25}{200 - j25} \end{bmatrix}$$

$$[S] = \begin{bmatrix} 0.27735\angle -19.44^\circ & 0.7442\angle 7.125^\circ \\ 0.7442\angle 7.125^\circ & 0.27735\angle -19.44^\circ \end{bmatrix}$$