```
S11 = .73 Exp[-I 126 °];
S12 = 0;
S21 = 0;
S22 = .75 Exp[-I 52 °];
Zc = 50;
denom = (1 - S11) (1 - S22) - S12 S21;
toPolar[Z_] := With[{n = Abs[Z], a = 180 * Arg[Z] / π}, Defer[n e^(i a)]];
```

$$Z_{11} = Z_c \frac{(1 + S_{11})(1 - S_{22}) + S_{12} S_{21}}{denom}$$

$$Z_{12} = 2 Z_c \frac{S_{12}}{denom}$$

$$Z_{21} = 2 Z_c \frac{S_{12}}{denom}$$

$$Z_{22} = Z_c \frac{(1 + S_{22})(1 - S_{11}) + S_{12} S_{21}}{denom}$$

```
9.76761 - 24.6995 i

0. + 0. i

0. + 0. i

34.2328 - 92.4884 i

f = 10 * 10^9; L = .1 * 10^-9;
InductorImpedance = I 2 π f L;

Z11out = Z11 + InductorImpedance
Z12out = Z12 + InductorImpedance
Z21out = Z21 + InductorImpedance
Z22out = Z22 + InductorImpedance

9.76761 - 18.4164 i

0. + 6.28319 i

0. + 6.28319 i

34.2328 - 86.2052 i

Δ = (Z11out + Zc) (Z22out + Zc) - Z12out Z21out;
```

$$S_{11_{out}} = toPolar\left[\frac{(Z_{11_{out}} - Z_c)(Z_{22_{out}} + Z_c) - Z_{12_{out}} Z_{11_{out}}}{\Delta}\right]$$

$$S_{12_{out}} = toPolar\left[\frac{2 Z_{12_{out}} Z_c}{\Delta}\right]$$

$$S_{21_{out}} = toPolar\left[\frac{2 Z_{21_{out}} Z_c}{\Delta}\right]$$

$$S_{22_{out}} = toPolar\left[\frac{(Z_{11_{out}} + Z_c)(Z_{22_{out}} - Z_c) - Z_{12_{out}} Z_{21_{out}}}{\Delta}\right]$$

```
0.7172864913467685` e^(i (-137.49932703274516`))
```

$$0.08315602149436857` e^{i\,152.5225906137076`}$$

$$0.08315602149436857` e^{i\,152.5225906137076`}$$

$$0.7229654599579297` e^{i\,(-54.60089626858122`)}$$