(2) From the Smith chart the shorted stub has normalized ADMITTANCE -j1.06. Point A

The matching point must then have

$y_i = 1 + j\cdot 1.06$ Point B

0.15λ away gives the normalized load admittance y_L=0.48+j0.08.

The normalized load is at the point marked ζ_L =2.6-j0.6

$Z_L = 50\cdot 2.6 - j\cdot 0.6 = 130 - j\cdot 30$

From this point $|\rho = 0.46|$ $\phi = -10$ degrees $S = 2.7$

(3) Use $\gamma = \sqrt{Z\cdot Y}$

$$\gamma = \sqrt{(R + j\cdot\omega\cdot L)\cdot(G + j\cdot\omega\cdot C)} = j\cdot\omega\cdot\sqrt{L\cdot C}\cdot\left(1 - j\cdot\frac{R}{\omega\cdot L}\right)^{\frac{1}{2}}\cdot\left(1 - j\cdot\frac{G}{\omega\cdot C}\right)^{\frac{1}{2}}$$

Expand the factors to the power of 1/2

$$\gamma = j\cdot\omega\cdot\sqrt{L\cdot C}\cdot\left(1 - j\cdot\frac{R}{2\cdot\omega\cdot L}\right)\cdot\left(1 - j\cdot\frac{G}{2\cdot\omega\cdot C}\right)$$

α is found from the real part of γ. Neglecting small terms this gives

$$\alpha = \omega\cdot\sqrt{L\cdot C}\cdot\left(\frac{R}{2\cdot\omega\cdot L} + \frac{G}{2\cdot\omega\cdot C}\right)$$

Remember that $Z_0 = \sqrt{\frac{L}{C}}$

$$\alpha = \frac{R}{2\cdot Z_0} + \frac{G\cdot Z_0}{2}$$

$R := 10^{-3}$ $G := 10^{-6}$ $\omega := 2\cdot\pi\cdot 10^{8}$ $Z_0 := 75$

$\alpha := \frac{R}{2\cdot Z_0} + \frac{G\cdot Z_0}{2}$ $\alpha = 4.417\times 10^{-5}$