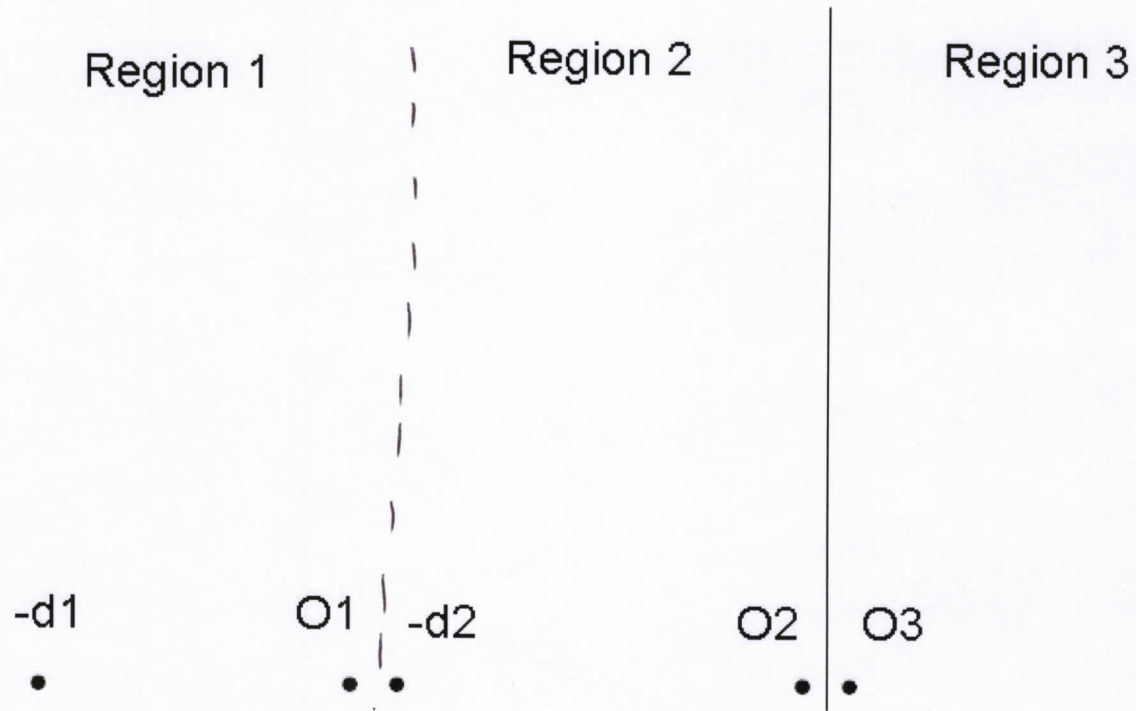


Cookbook for Normal Incidence (lossless case)



Step 1

Calculate η_1, η_2, η_3

For lossless medium

$$\eta = \sqrt{\frac{\mu}{\epsilon}}$$

For lossy medium

$$\eta = \sqrt{\frac{\mu}{\epsilon'} \left(1 - j \frac{\epsilon''}{\epsilon'}\right)^{-1/2}}$$

Step 2

$$Z_3(O3) = \eta_3$$

Step 3

$$Z_2(O2) = Z_3(O3)$$

Step 4

Normalize $Z_2(O2)$ using η_2

$$z_{2n}(O2) = \frac{Z_2(O2)}{\eta_2}$$

Plot $z_{2n}(O2)$ on the smith chart

Step 5

Rotate by a distance $d2$ towards the generator (Wavelength towards generator). The new point is named $z_{2n}(-d2)$

Step 6

Denormalize

$$Z_2(-d2) = z_{2n}(-d2) * \eta_2$$

Step 7

$$Z_1(O1) = Z_2(-d2)$$

Step 8

Normalize $Z_1(O1)$ using η_1

$$z_{1n}(O1) = \frac{Z_1(O1)}{\eta_1}$$

Plot $z_{1n}(O1)$ on the smith chart

Step 9

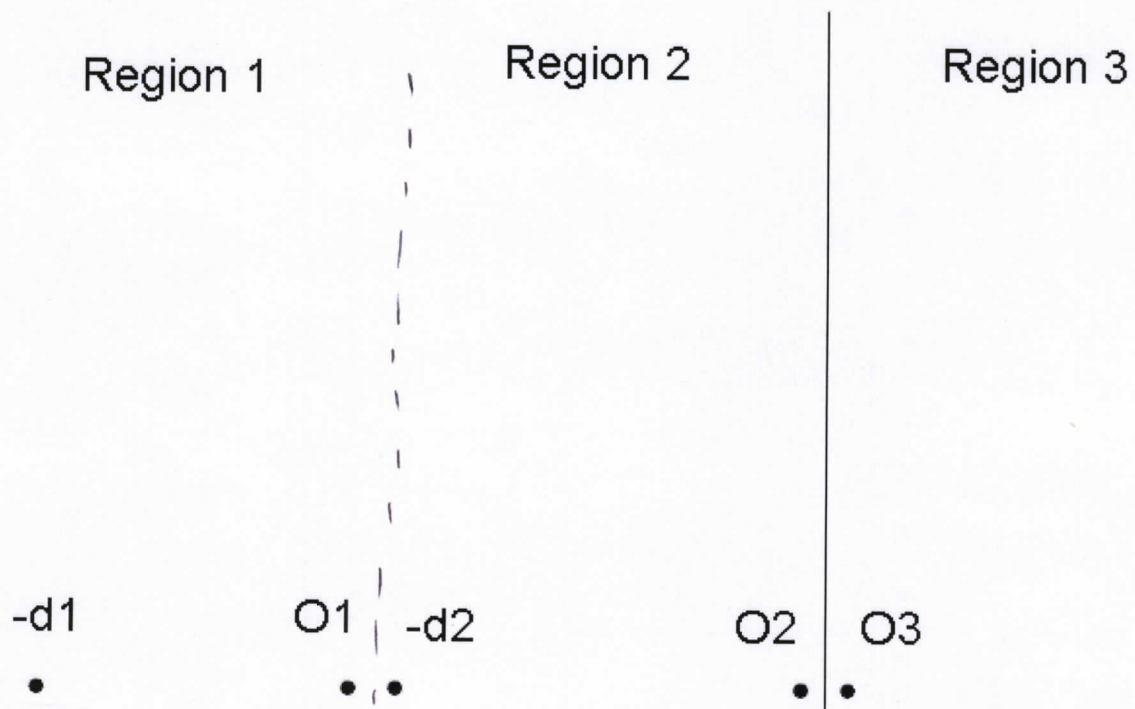
Rotate by a distance $d1$ towards the generator (Wavelength towards generator). The new point is named $z_{in}(-d1)$

Step 10

Denormalize

$$Z_1(-d1) = z_{in}(-d1) * \eta_1$$

Cookbook for Normal Incidence (lossy case)



Step 1

Calculate η_1, η_2, η_3

For lossless medium

$$\eta = \sqrt{\frac{\mu}{\epsilon}}$$

For lossy medium

$$\eta = \sqrt{\frac{\mu}{\epsilon}} \left(1 - j \frac{\epsilon''}{\epsilon'}\right)^{-1/2}$$

Step 2

$$Z_3(O3) = \eta_3$$

Step 3

$$Z_2(O2) = Z_3(O3)$$

Step 4

Normalize $Z_2(O2)$ using η_2

$$z_{2n}(O2) = \frac{Z_2(O2)}{\eta_2}$$

Plot $z_{2n}(O2)$ on the smith chart

Step 5

Rotate by a distance $d2$ towards the generator (Wavelength towards generator). The new point is named $z_{2n}(-d2)$ lossless

Step 6

Read the reflection coefficient $|\Gamma|$ from the line 'Reflection coeff E or L'

Name this $|\Gamma_{old}|$

$$|\Gamma_{new}| = e^{-2\alpha d} |\Gamma_{old}|$$

Plot Γ_{new} on the Smith chart

Read $z_{2n}(-d2)$ lossy

Step 6

Denormalize

$$Z_2(-d_2) = z_{2n}(-d_2) * \eta_2$$

Step 7

$$Z_1(-d_1) = Z_2(O_2) \quad Z_1(O_1) = Z_2(-d_2)$$

Step 8

Normalize $Z_1(O_1)$ using η_1

$$z_{1n}(O_1) = \frac{Z_1(O_1)}{\eta_1}$$

Plot $z_{1n}(O_1)$ on the smith chart

Step 9

Rotate by a distance d_1 towards the generator (Wavelength towards generator). The new point is named $z_{1n}(-d_1)$

Step 10

Denormalize

$$Z_1(-d_1) = z_{1n}(-d_1) * \eta_1$$