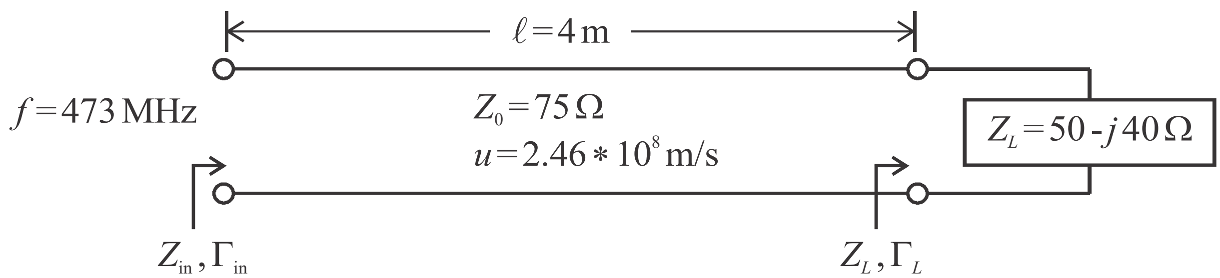
At 473 MHz, a load has an impedance of 50 - *j* 40 Ohms. If it is attached to a lossless transmission line (similar to RG-6) where $Z_0 = 75$ Ohms, $u = 2.46 \times 10^8$ m/s, & $l = 4$ m, calculate phase constant, wavelength, electrical length, reflection coefficients at the input and load ends of the transmission line, input impedance, and standing wave ratio.



Given: $f := 473 \cdot 10^6$ Hz $L := 4$ m $u := 2.46 \cdot 10^8$ m/s

$Z0 := 75$ Ω $ZL := 50 - j \cdot 40$ Ω

Calculate phase constant β, wavelength λ, and electrical length βL:

$\beta := \frac{2 \cdot \pi \cdot f}{u}$ $\boxed{\beta = 12.081}$ rad/m

$\lambda := \frac{u}{f}$ $\boxed{\lambda = 0.5201}$ m

$\beta L := \beta \cdot L$ $\boxed{\beta L = 48.324}$ rad $\boxed{\beta L \cdot \frac{180}{\pi} = 2768.8}$ deg $\boxed{\frac{\beta L}{2 \cdot \pi} = 7.691}$ λ

Calculate reflection coefficients at input Γin and load ΓL:

$\Gamma L := \frac{ZL - Z0}{ZL + Z0}$ $\boxed{|\Gamma L| = 0.3594}$ $\boxed{\arg(\Gamma L) \cdot \frac{180}{\pi} = -104.261}$ deg

$\Gamma in := \Gamma L \cdot e^{-j \cdot 2 \cdot \beta \cdot L}$ $\boxed{|\Gamma in| = 0.3594}$ $\boxed{\arg(\Gamma in) \cdot \frac{180}{\pi} = 118.178}$ deg

Calculate input impedance and standing wave ratio:

$Zin := Z0 \cdot \frac{(1 + \Gamma in)}{1 - \Gamma in}$ $\boxed{Zin = 44.472 + 32.358i}$ Ω

$S := \frac{(1 + |\Gamma in|)}{(1 - |\Gamma in|)}$ $\boxed{S = 2.122}$ $VSWR := \frac{1 + |\Gamma L|}{1 - |\Gamma L|}$ $\boxed{VSWR = 2.122}$