

Problem 2.61 Using a slotted line on a $50\text{-}\Omega$ air-spaced lossless line, the following measurements were obtained: $S = 1.6$ and $|\tilde{V}|_{\max}$ occurred only at 10 cm and 24 cm from the load. Use the Smith chart to find Z_L .

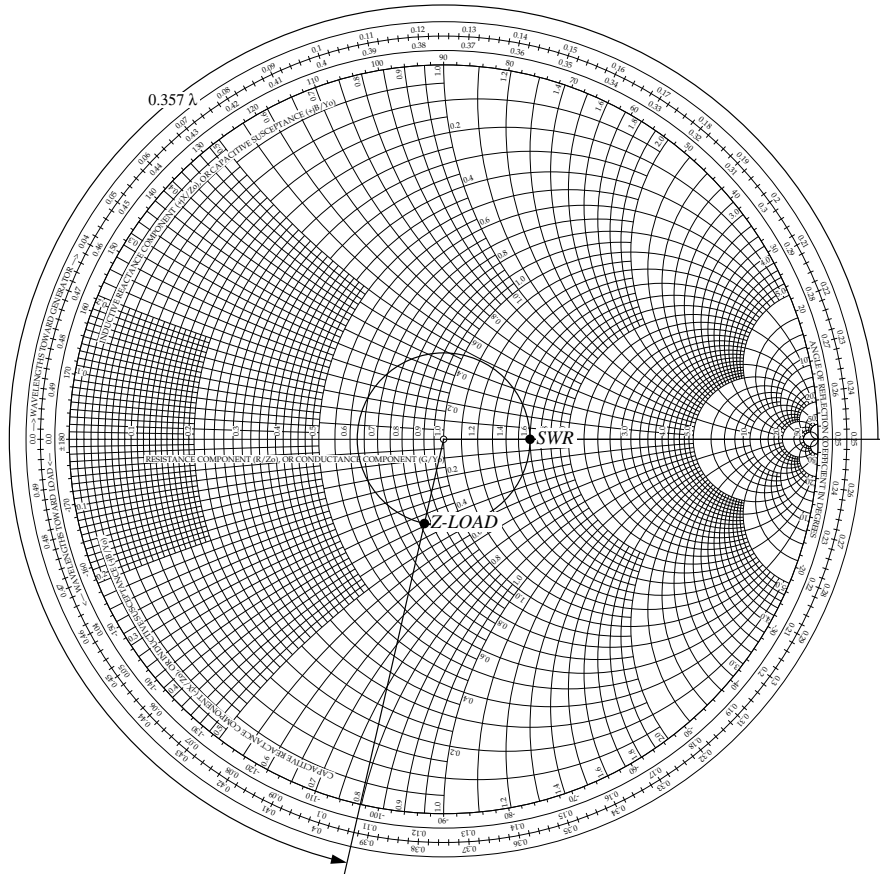


Figure P2.61: Solution of Problem 2.61.

Solution: Refer to Fig. P2.61. The point SWR denotes the fact that $S = 1.6$. This point is also the location of a voltage maximum. From the knowledge of the locations of adjacent maxima we can determine that $\lambda = 2(24\text{ cm} - 10\text{ cm}) = 28\text{ cm}$. Therefore, the load is $\frac{10\text{ cm}}{28\text{ cm}}\lambda = 0.357\lambda$ from the first voltage maximum, which is at 0.250λ on the WTL scale. Traveling this far on the SWR circle we find point $Z\text{-LOAD}$ at $0.250\lambda + 0.357\lambda - 0.500\lambda = 0.107\lambda$ on the WTL scale, and here

$$z_L = 0.82 - j0.39.$$

Therefore $Z_L = z_L Z_0 = (0.82 - j0.39) \times 50 \, \Omega = (41.0 - j19.5) \, \Omega$.
