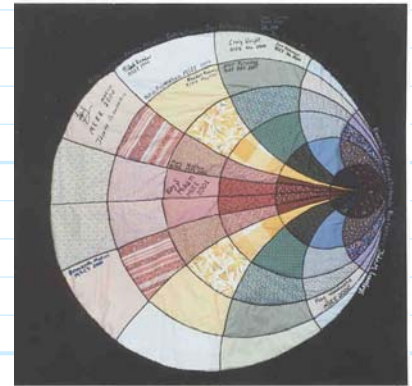


2.4 - The Smith Chart

Reading Assignment: *pp. 64-73*

The Smith Chart → An icon of microwave engineering!



The Smith Chart provides:

- 1) A graphical method to solve many transmission line problems.
- 2) A visual indication of microwave device performance.

The **most** important fact about the Smith Chart is:

→ It exists on the complex Γ plane.

HO: THE COMPLEX Γ PLANE

Q: *But how is the complex Γ plane useful?*

A: We can easily plot and determine values of $\Gamma(z)$

HO: TRANSFORMATIONS ON THE COMPLEX Γ PLANE

Q: *But transformations of Γ are relatively easy—transformations of line impedance Z is the **difficult** one.*

A: We can likewise map **line impedance** onto the complex Γ plane!

HO: MAPPING Z TO Γ

HO: THE SMITH CHART

HO: SMITH CHART GEOGRAPHY

HO: THE OUTER SCALE

The Smith Chart allows us to **solve** many important transmission line problems!

HO: Z_{IN} CALCULATIONS USING THE SMITH CHART

EXAMPLE: THE INPUT IMPEDANCE OF A SHORTED TRANSMISSION LINE

EXAMPLE: DETERMINING THE LOAD IMPEDANCE OF A TRANSMISSION LINE

EXAMPLE: DETERMINING THE LENGTH OF A TRANSMISSION LINE

An alternative to impedance Z , is its inverse—**admittance** Y .

HO: IMPEDANCE AND ADMITTANCE

Expressing a load or line impedance in terms of its admittance is sometimes helpful. Additionally, we can easily map admittance onto the Smith Chart.

HO: ADMITTANCE AND THE SMITH CHART

EXAMPLE: ADMITTANCE CALCULATIONS WITH THE SMITH CHART