Curs 6:

(P2.8) continuare $\quad z_L = 30 - 20j \;;\quad z_0 = 75\,\Omega \;;$

$z_{in} = ?$ $\qquad\qquad \ell = 0.3\lambda$

$$z_{in} = z_0 \cdot \frac{z_L + j z_0 \operatorname{tg} \beta\ell}{z_0 + j z_L \operatorname{tg} \beta\ell} = \frac{30 - 20j + j\,75 \cdot \operatorname{tg} \frac{2\pi}{\lambda} \cdot 0.3\lambda}{75 + j(30 - 20j) \operatorname{tg} \frac{2\pi}{\lambda} 0.3\lambda} =$$

$$\left(\beta = \frac{2\pi}{\lambda}\right) \qquad = \frac{30 - 34.45\,j}{75 + j\,21.78 - j^2 \times 11.52} = \frac{30 - 34.45\,j}{89.52 + 21.78\,j} =$$

$$\cong \frac{30 - 34j}{90 + 22j} = \frac{(30 - 34j)(90 - 22j)}{90 \times 90 + 22 \times 22} =$$

$$= \frac{2700 - 660j - 3060j + j^2 748}{8584} =$$

$$= 0.23 - 0.43j\ \Omega$$

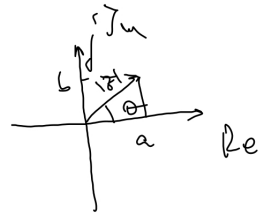
# Diagrama Smith:

- metodă grafică de reprezentare a impedanței.
- → reprezentare complexă a coef. de reflexie $\Gamma$.

$$\Gamma = \frac{z_L - z_0}{z_L + z_0}$$

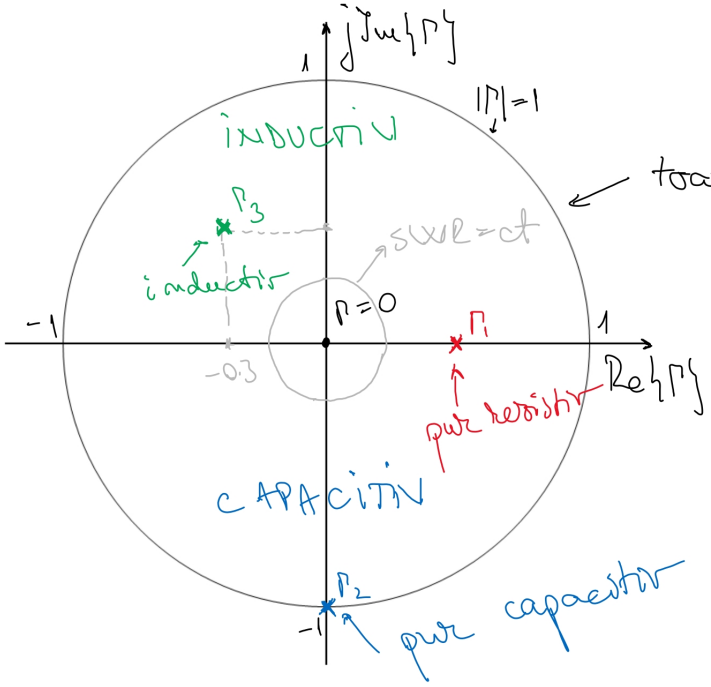
$$0 \le |\Gamma| \le 1$$

$z = a + jb$




$z = |z| e^{j\theta}$

$\theta = \operatorname{arctg} \frac{Im}{Re}$




← toate valorile lui $z_L$ pentru care $\Gamma$ se află în cercul $|\Gamma| = 1$

$$SWR = \frac{1+|\Gamma|}{1-|\Gamma|}$$

$SWR = 1 \Rightarrow |\Gamma| = 0$ - centrul diagramei Smith

$SWR = 3 \Rightarrow |\Gamma| = 0.5$

**ex 1.** $\Gamma_1 = 0.5$ (presupunem $z_0 = 50\Omega$)

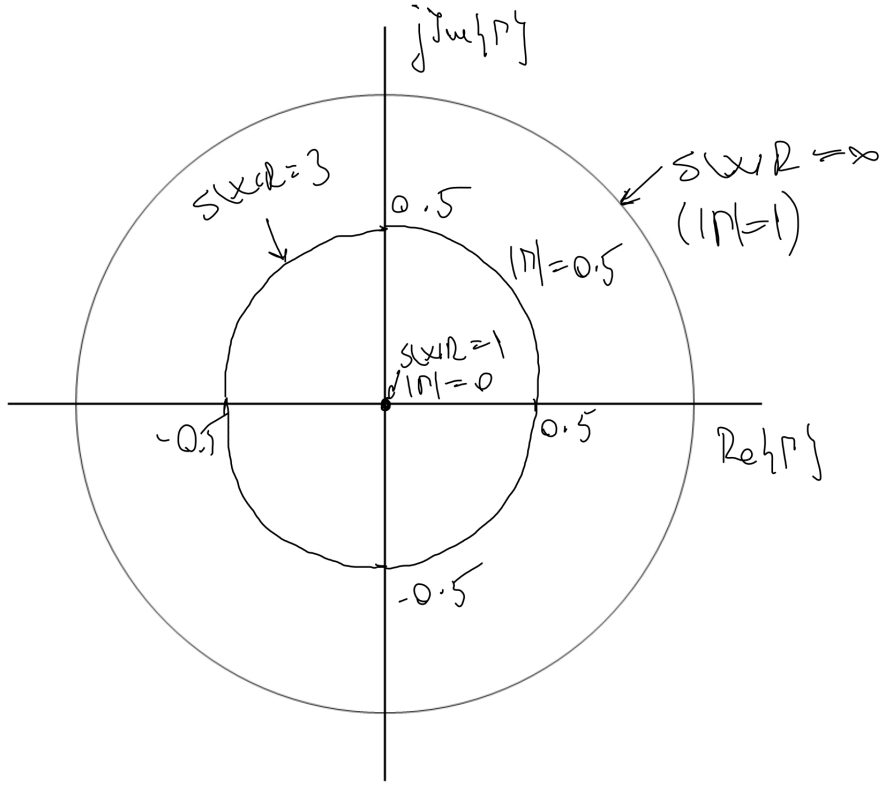
$$z_L = z_0 \frac{1+\Gamma}{1-\Gamma} = 50 \cdot \frac{1.5}{0.5} = 50 \cdot 3 = 150\Omega$$

**ex 2:** $\Gamma_2 = -j \Rightarrow z_L = 50 \cdot \frac{1-j}{1+j} =$

$$= \frac{(1-j)^2}{(1+j)(1-j)} =$$

$$= \frac{1-2j+j^2}{1-j^2} z_0 = -\frac{2j}{2} z_0$$

$z_L = -j50\Omega$



## Impedanța de sarcină normalizată:

$$z_L = \frac{Z_L}{Z_0} = \frac{1+\Gamma}{1-\Gamma} \Rightarrow$$

$$\Rightarrow z_L \leftrightarrow \Gamma$$

## Cercurile de rezistență constantă:

Considerăm $z_L = 1 + j \cdot Y$, $Y \in \mathbb{R}$

Cum arată $+z(Y)$ pe diag. Smith pt. orice $Y$?

$z_0 = 1 + 0j$

$z_L = 1 - 1j$

$z_L = -1 + 2j$

$z_L = 1 - 4j$

$z_L = 1 - \infty$

$z_L = \infty$

$\Rightarrow z_L = \frac{1+\Gamma}{1-\Gamma} =$

$1 \Rightarrow \Gamma + X = X - \Gamma \Rightarrow 2\Gamma = 0$

$\Rightarrow \Gamma = 0$ ($\Gamma_1$)

$z_L = 1 + 1j \Rightarrow \ldots = +\frac{2}{5} j \frac{1+\Gamma}{\Gamma} =$

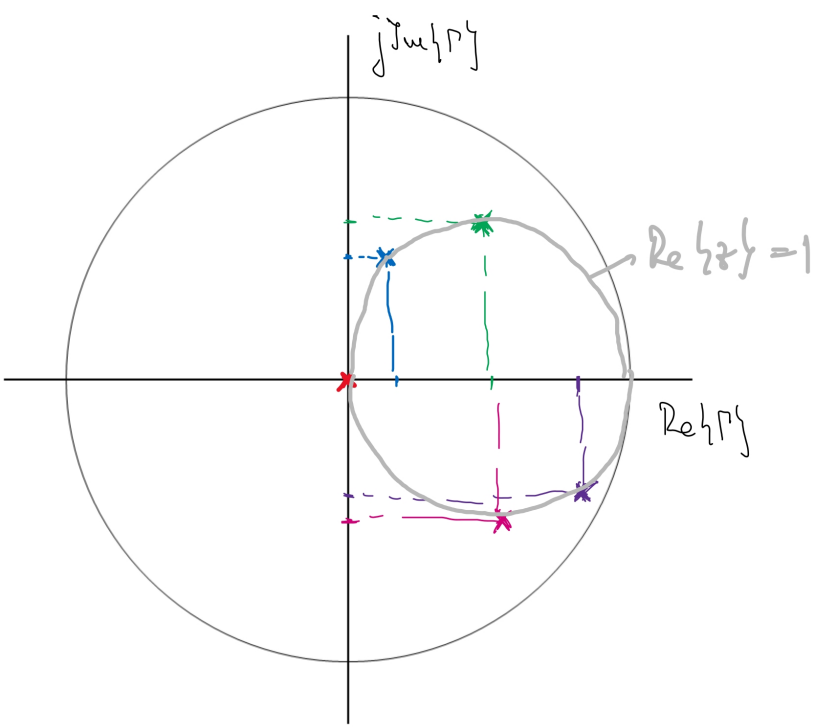
$z_L = 1 + 2j \Rightarrow \ldots \Gamma = \frac{1}{5} + j \cdot \frac{2}{5}$ ($\Gamma_2$)

($\Gamma_3$)

$z_L$

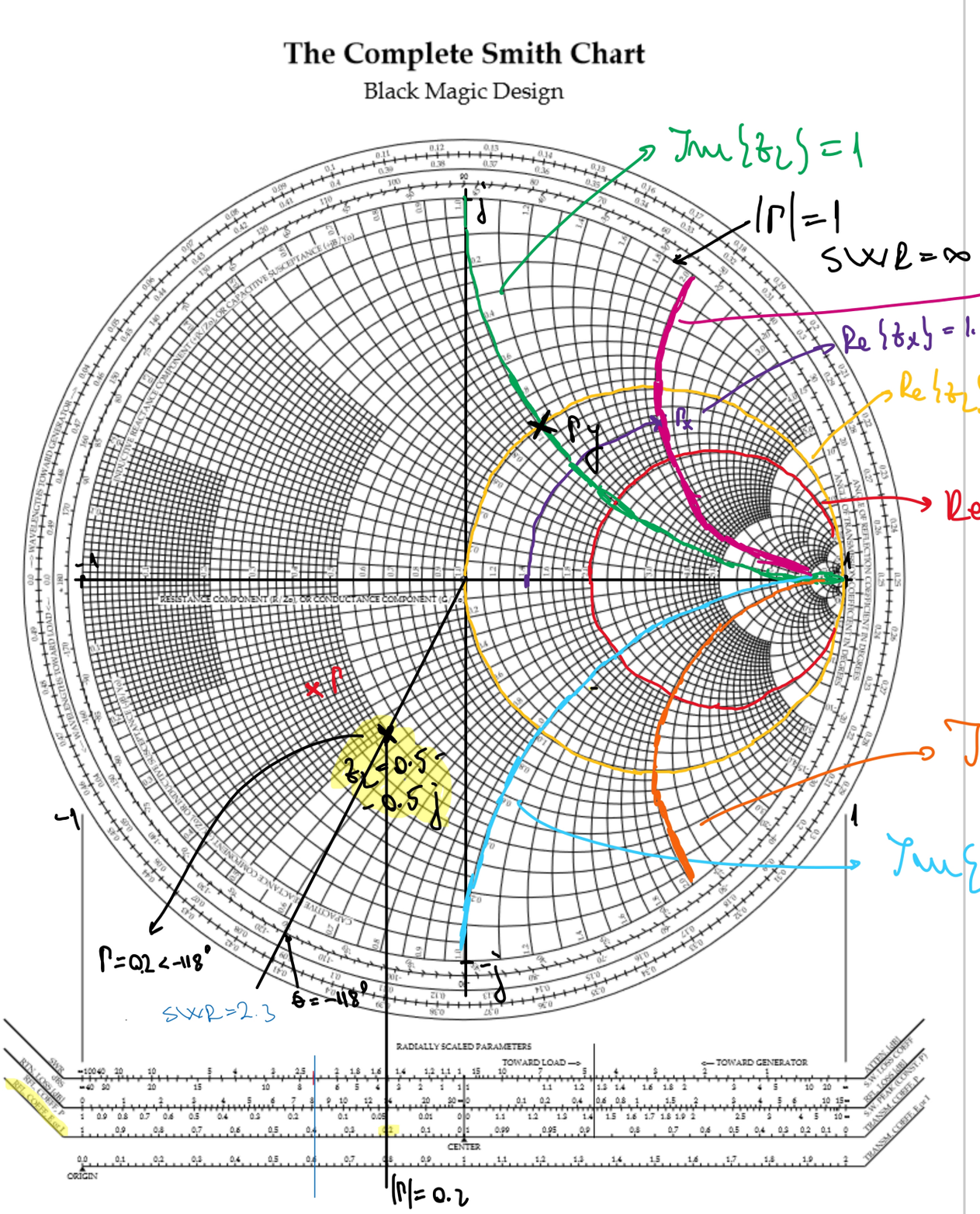
$z_L = 1 - 4j \Rightarrow \ldots \Gamma = \frac{4}{5} - \frac{2}{5} j$ $\Gamma_4$

$z_L = 1 - 2j \Rightarrow \Gamma = \frac{1}{2} - \frac{1}{2} j$ $\Gamma_5$




## Curbele de reactanță constantă

consid $z_L = Y + j$, $Y \in \mathbb{R}$




$z_L = 0.5 - 0.5j$
repr. pe diag. Smith

$z_y = 1 + j$