

EE 3113

INTRODUCTION INTO RF

CIRCUIT DESIGN

Lecture Notes for A-term 1999

LECTURE 9

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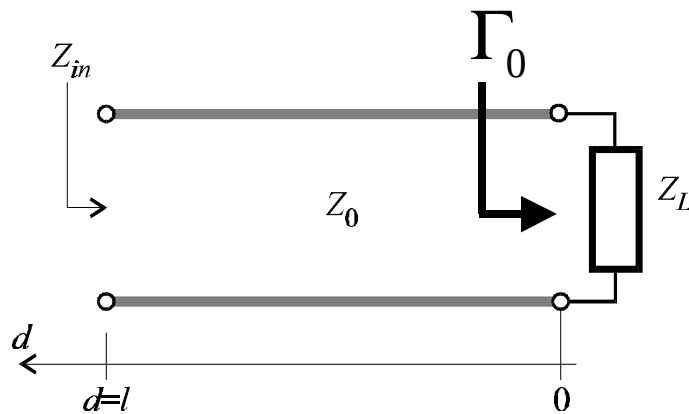
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Impedance Transformation (Smith Chart)

- Reflection coefficient in phasor form



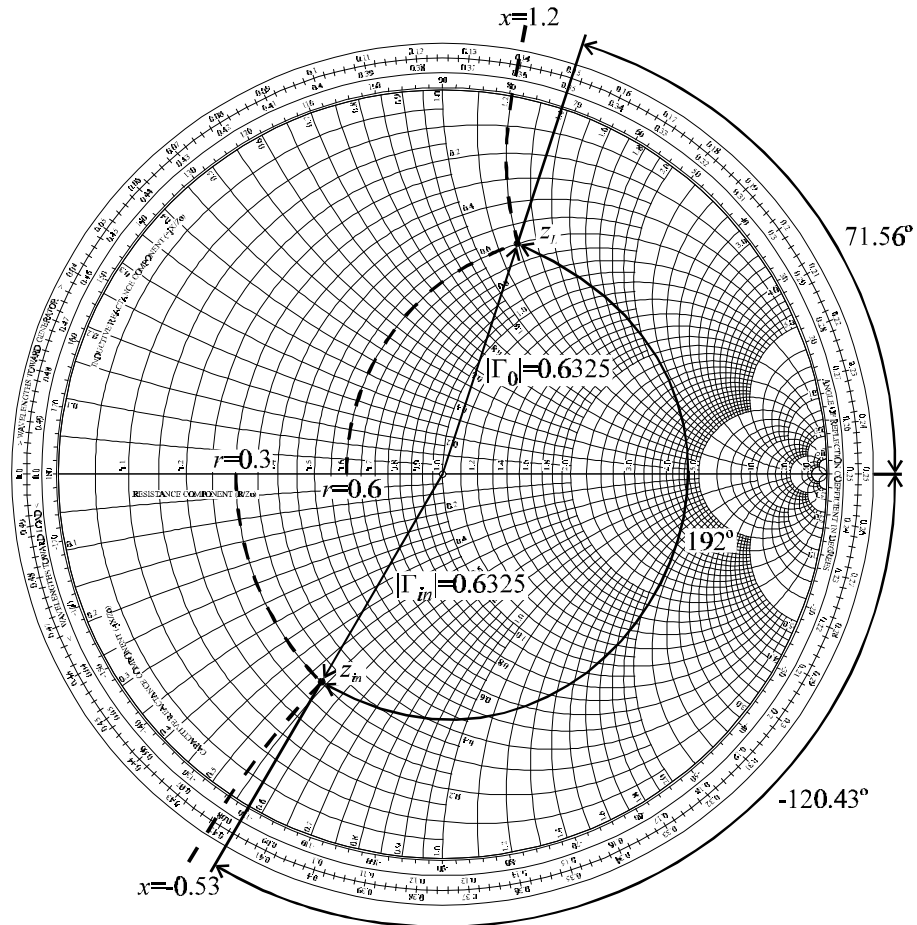
$$\Gamma_0 = \frac{Z_L - Z_0}{Z_L + Z_0} = \Gamma_{0r} + j\Gamma_{0i} = |\Gamma_0| e^{jq_L}$$

$$Z_{in}(d)/Z_0 = z_{in} = r + jx = \frac{1 + \Gamma(d)}{1 - \Gamma(d)} = \frac{1 + \Gamma_r + j\Gamma_i}{1 - \Gamma_r - j\Gamma_i}$$

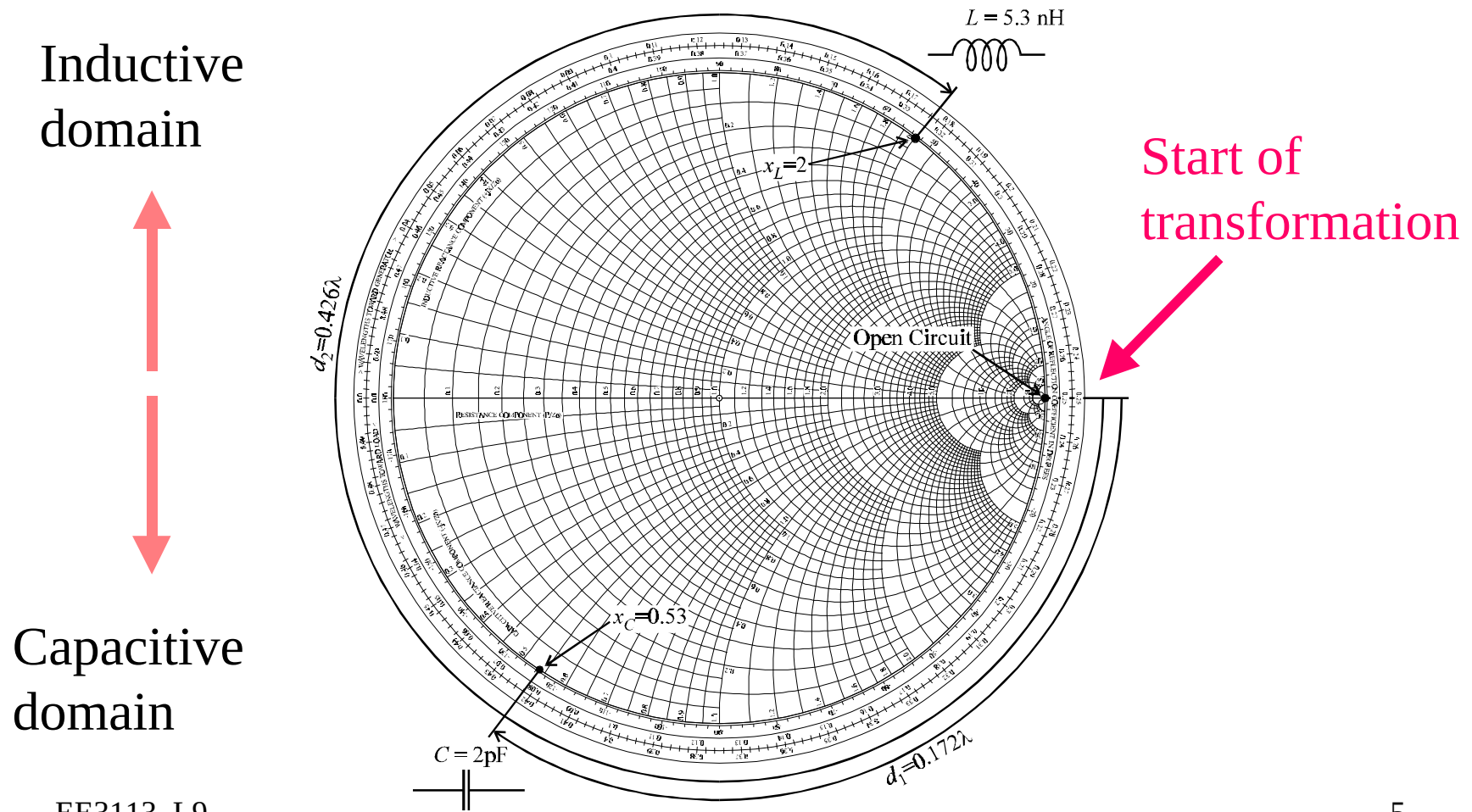
Generic Smith Chart computation

- Normalize load impedance $Z_L \rightarrow z_L$
- find reflection coefficient $z_L \rightarrow \Gamma_0$
- rotate reflection coefficient $\Gamma_0 \rightarrow \Gamma(d)$
- record normalized input impedance $z_{in}(d)$
- de-normalize input impedance $z_{in}(d) \rightarrow Z_{in}(d)$

Graphical display



How to create ideal capacitors and inductors with a transmission line?



Start of
transformation

