

EE 3113

INTRODUCTION INTO RF

CIRCUIT DESIGN

Lecture Notes for A-term 1999

LECTURE 21

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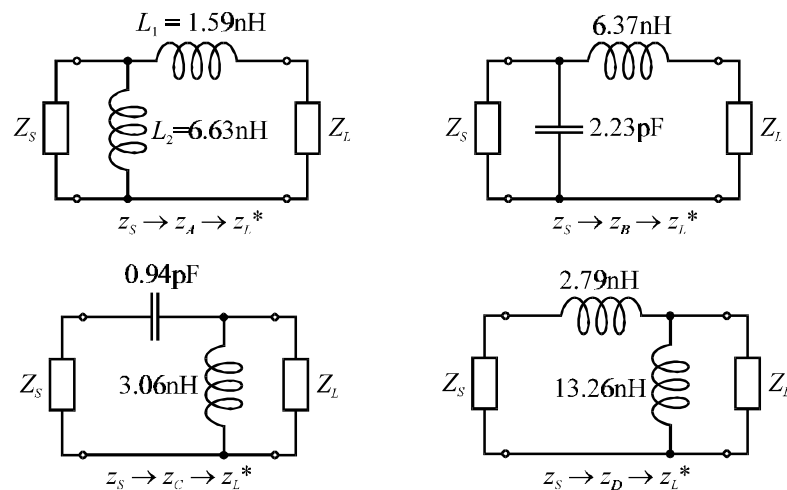
Worcester Polytechnic Institute

Worcester, MA 01609

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There are two strategies

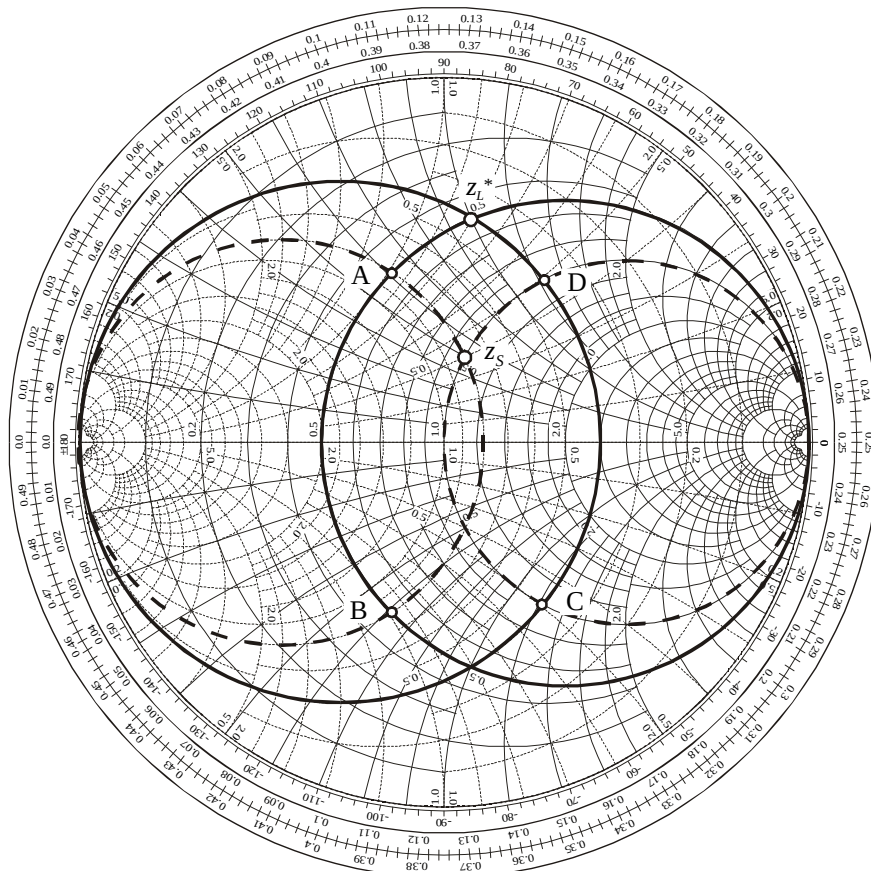
A) Source impedance $\rightarrow$ conjugate complex load impedance



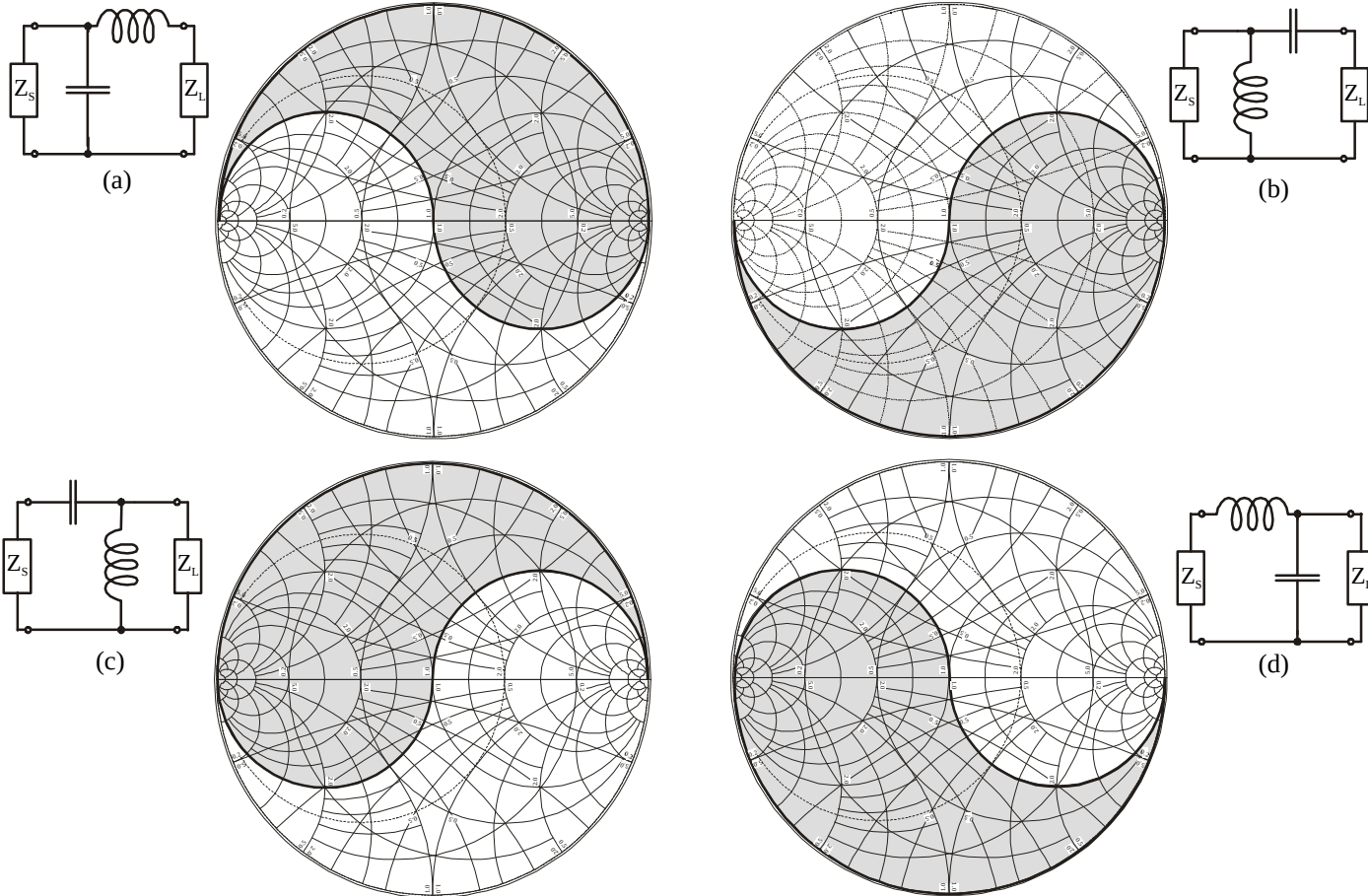
B) Load impedance $\rightarrow$ conjugate complex source impedance

A) General two-element approach

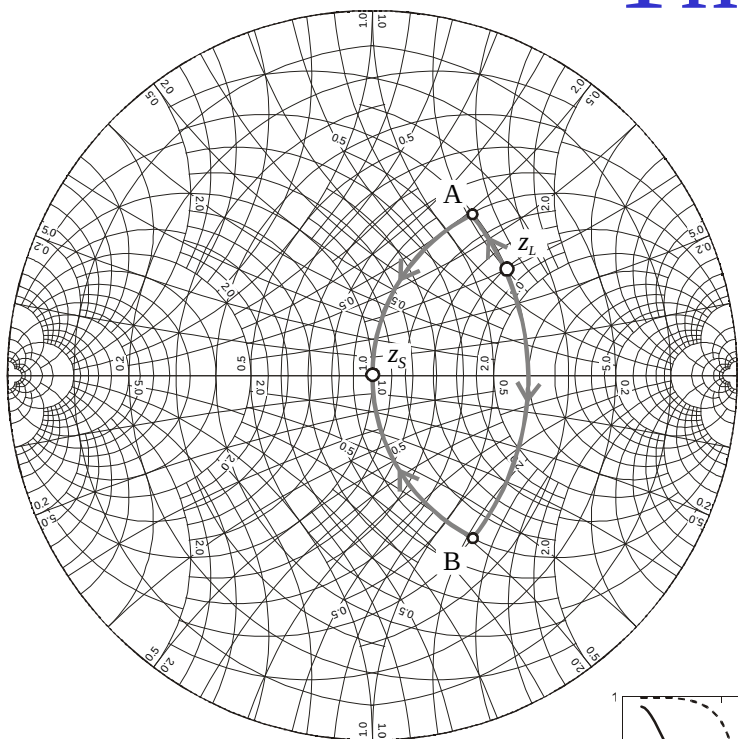
Source impedance
transformation to
conj. comp. load



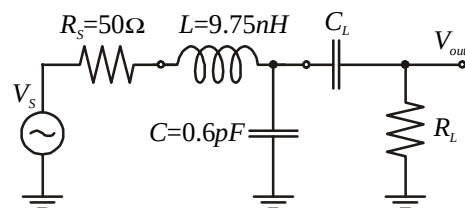
B) Load impedance to conjugate complex source impedance ($Z_S = Z_S^* = 50\Omega$)



The art of designing MNs

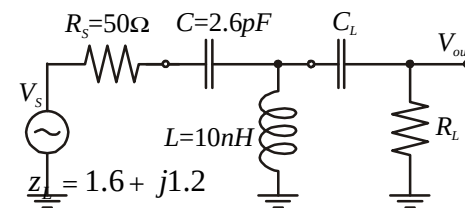


$f = 1 \text{ GHz}$
 $Z_0 = 50 \text{ Ohm}$

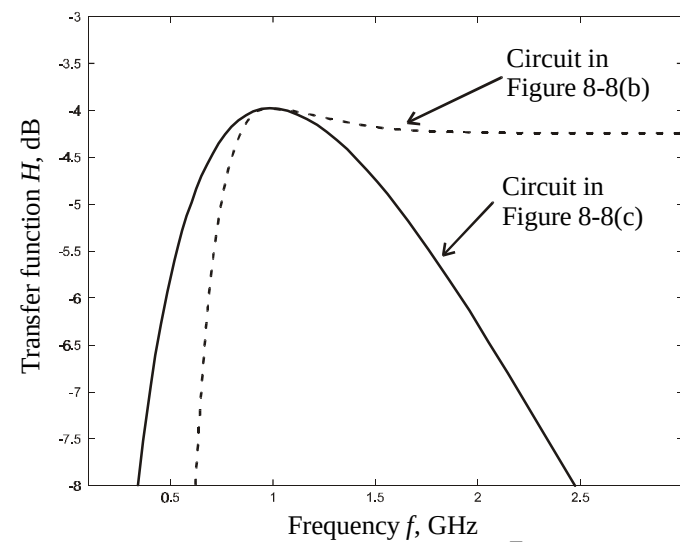
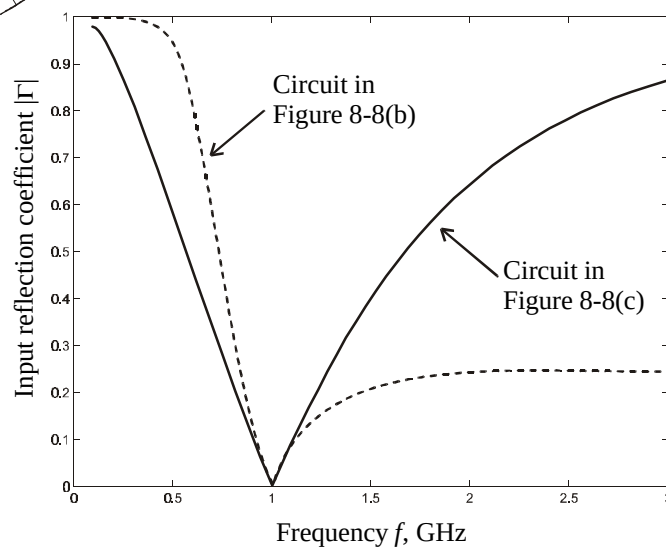


(b)

$$Z_L = 1.6 + j1.2$$

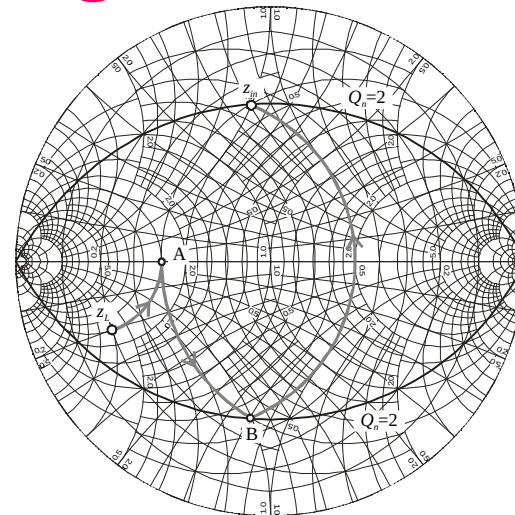


(c)

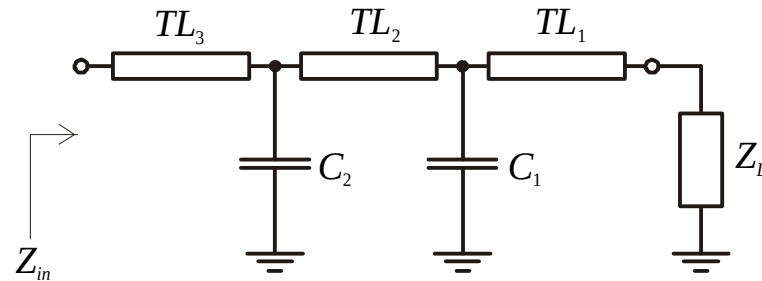


More complicated networks

- Three-element Pi and T networks permit the matching of almost any load conditions
- Added element has the advantage of more flexibility in the design process (fine tuning)
- Provides quality factor design (see Ex. 8.4)



MN realizations in microstrip line



- Distributed microstrip lines and lumped capacitors
- less susceptible to parasitics
- easy to tune
- efficient PCB implementation
- small size for high frequency

Microstrip line procedure

$$Z_L = (30 + j10)\Omega \longrightarrow Z_{in} = (60 + j80)\Omega$$

