

Electric Circuit for Physicists

電子回路論 第9回

Figure part

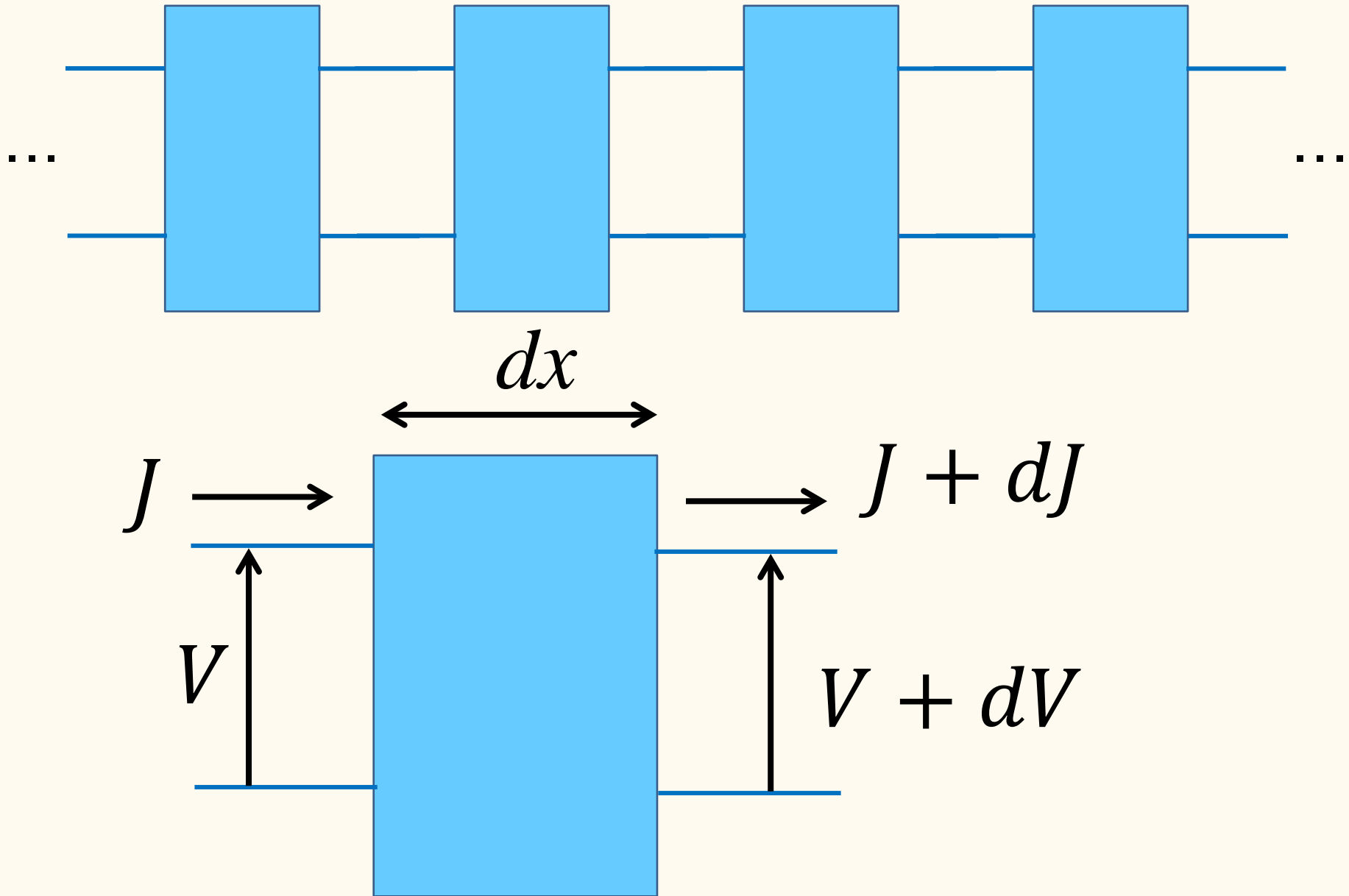
東京大学理学部・理学系研究科

物性研究所

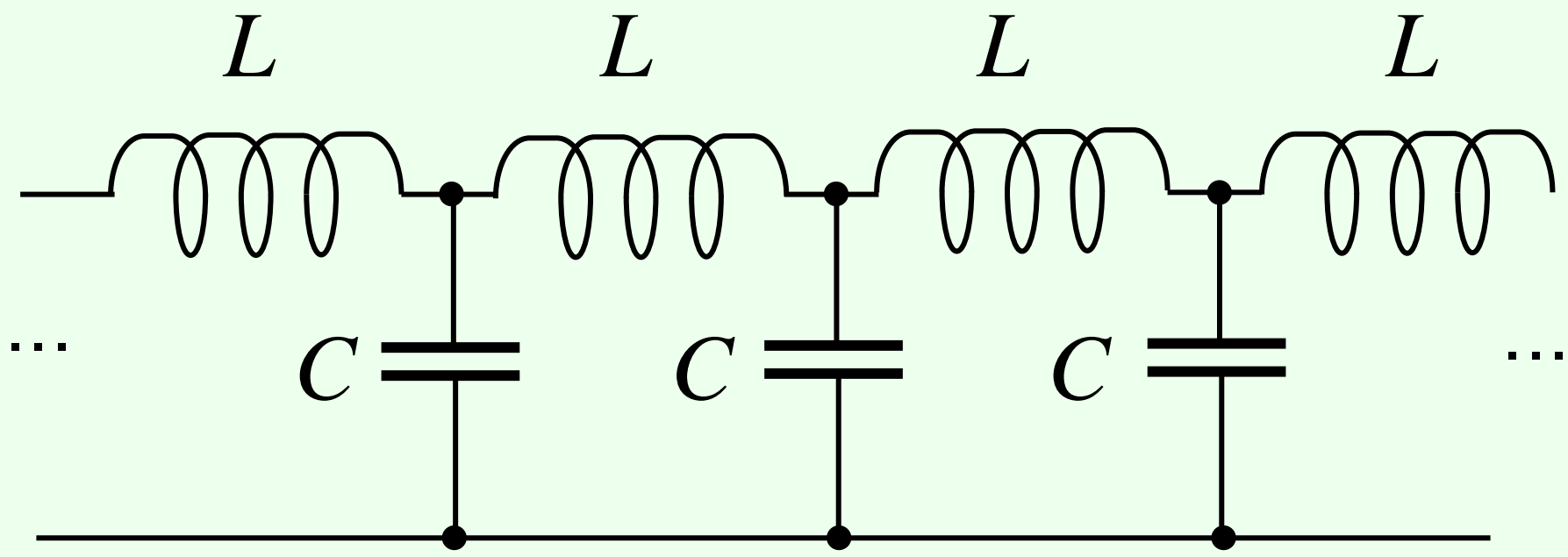
勝本信吾

Shingo Katsumoto

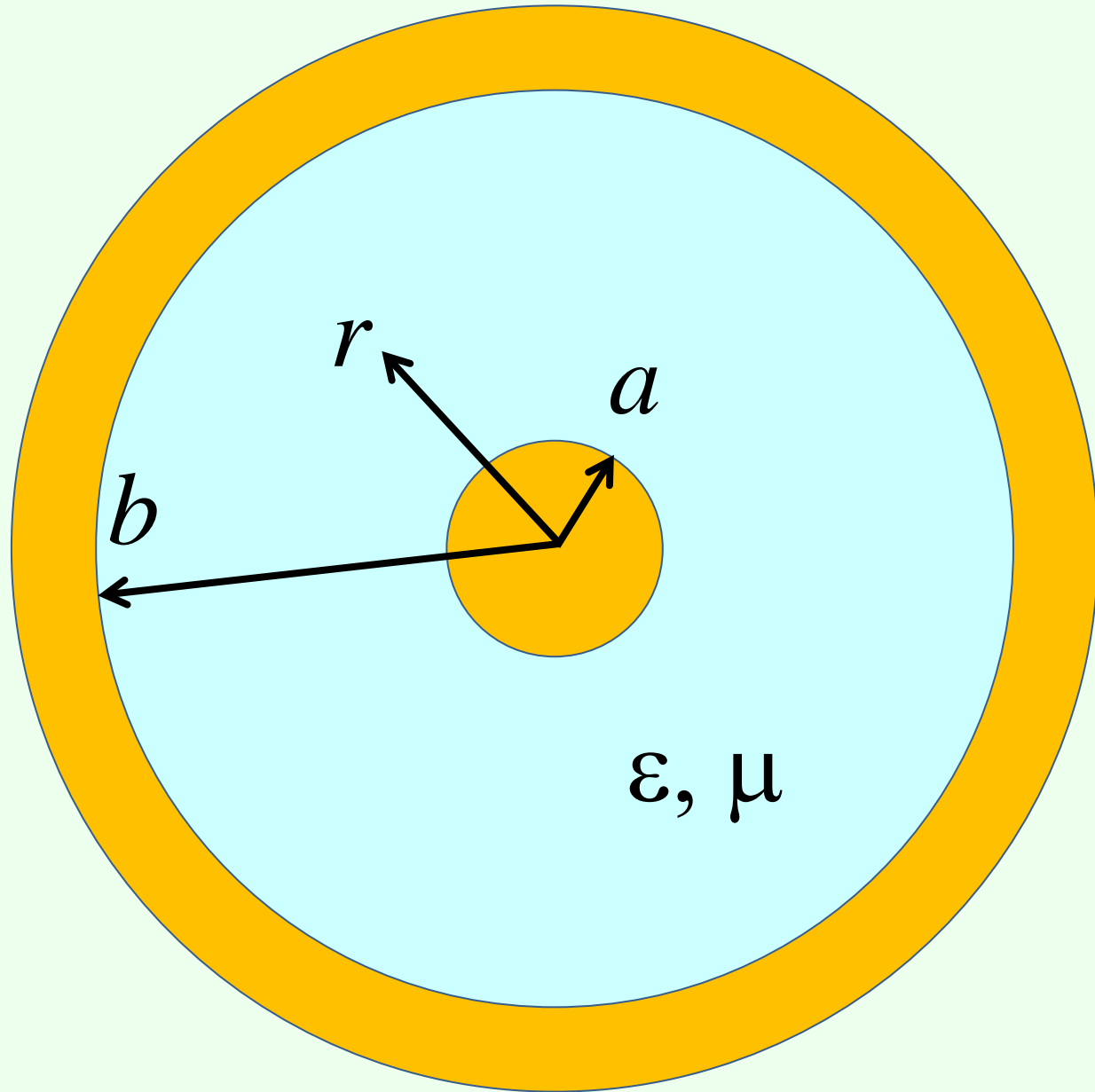
Characteristic impedance



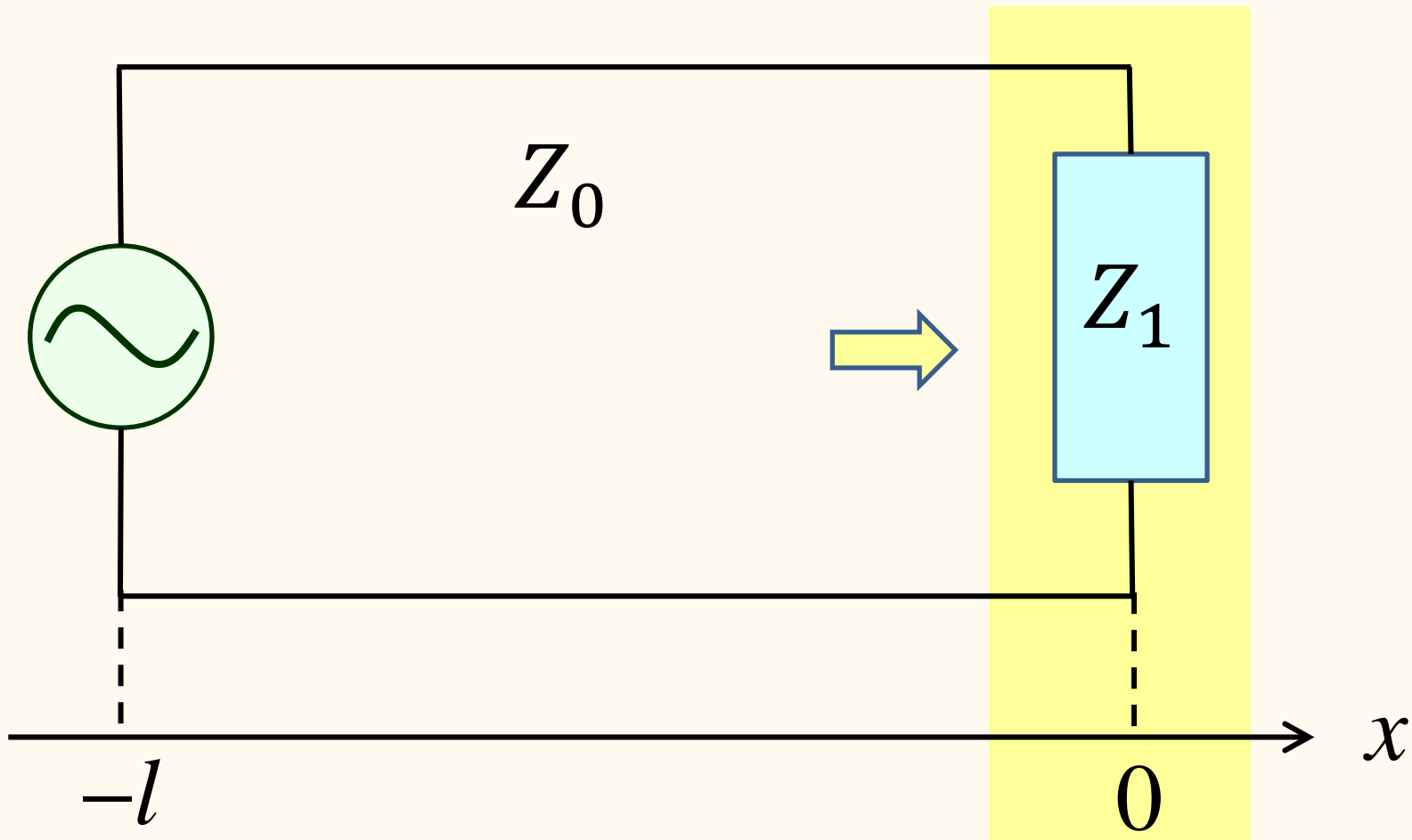
Pure reactance transmission line



Coaxial cable setup



Connection and termination



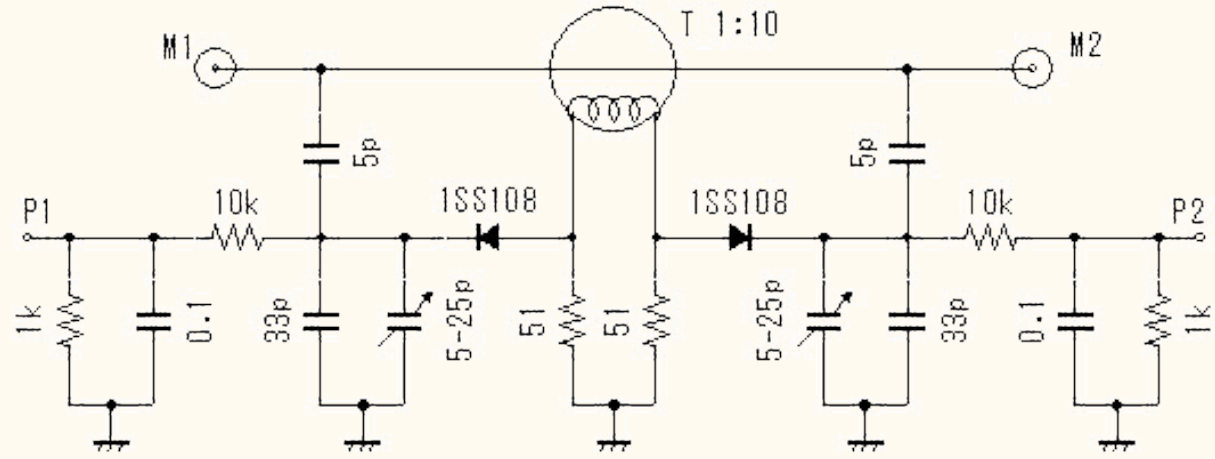
SWR measurement

SWR Meters:

Desktop types

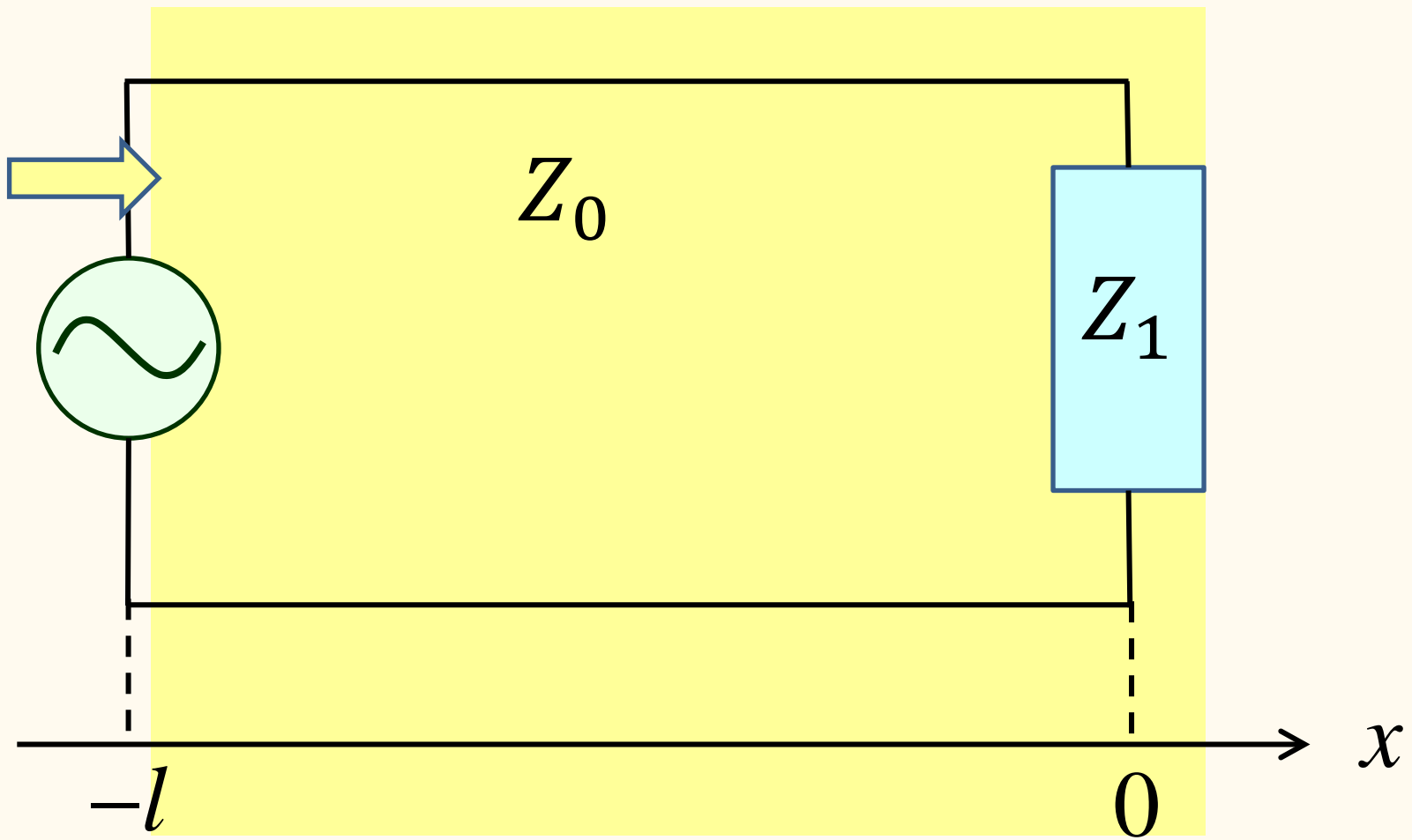


Cross-meter

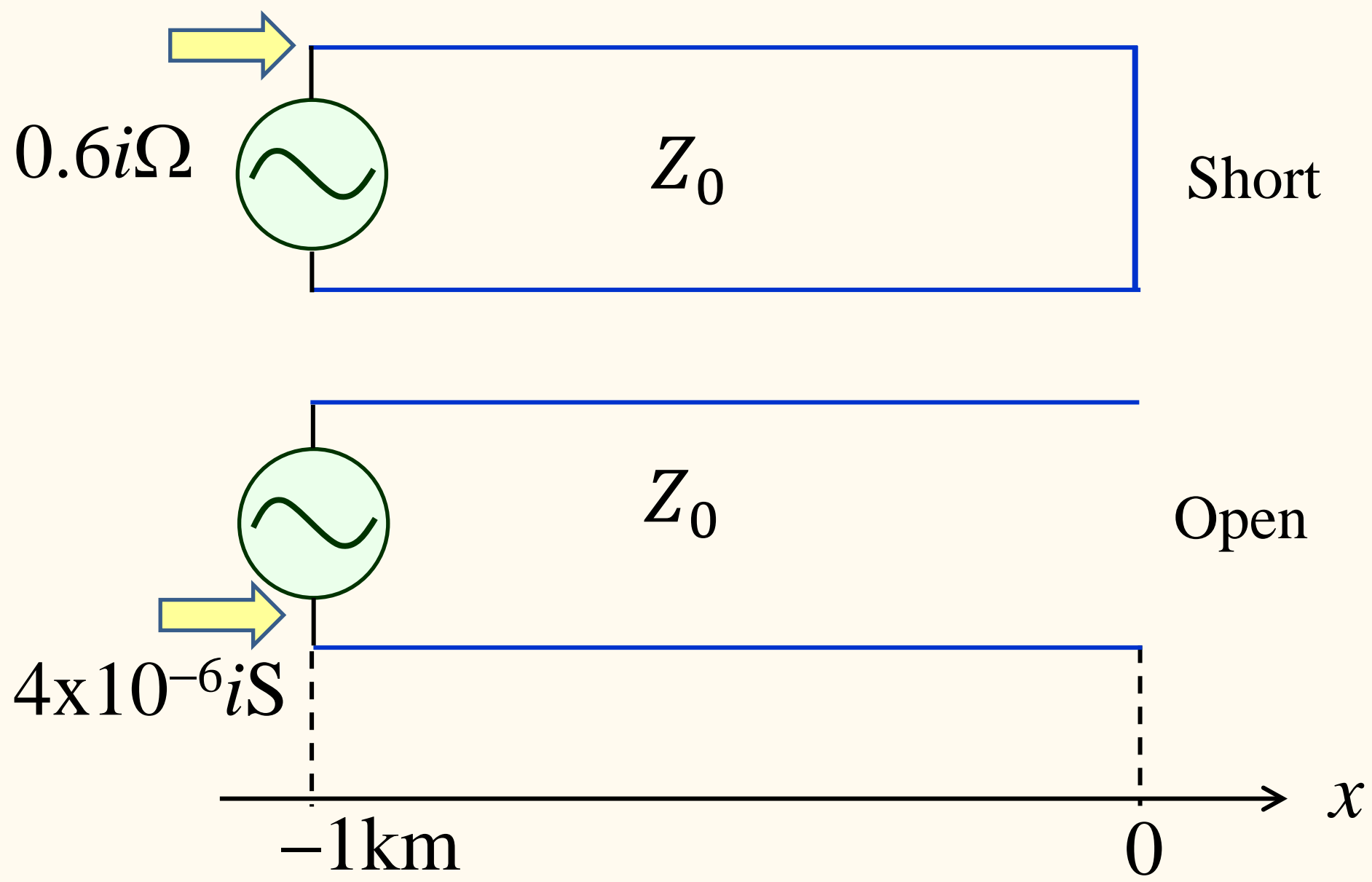


Handy type

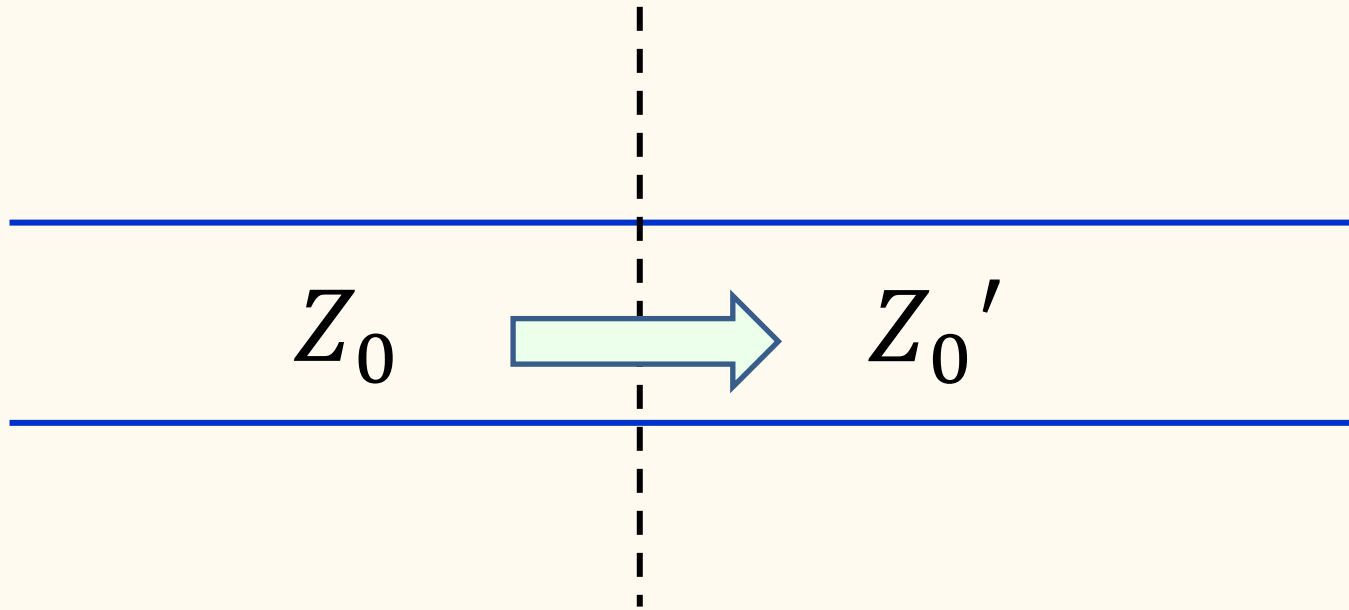
Connection and termination



Exercise 4-3



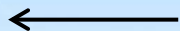
Connection and termination



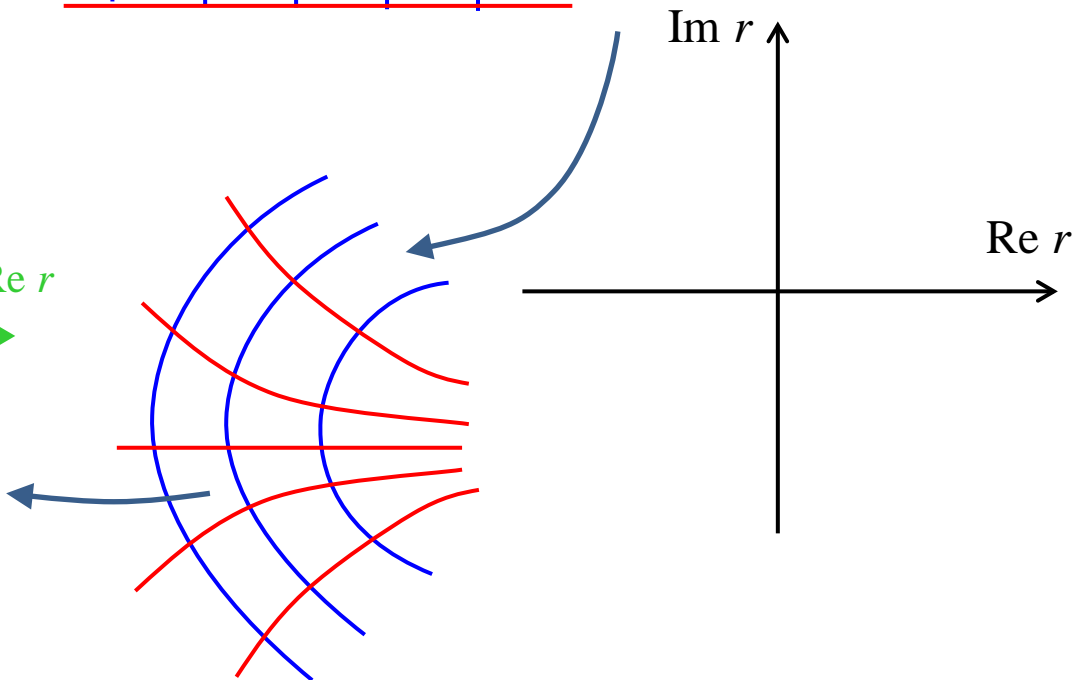
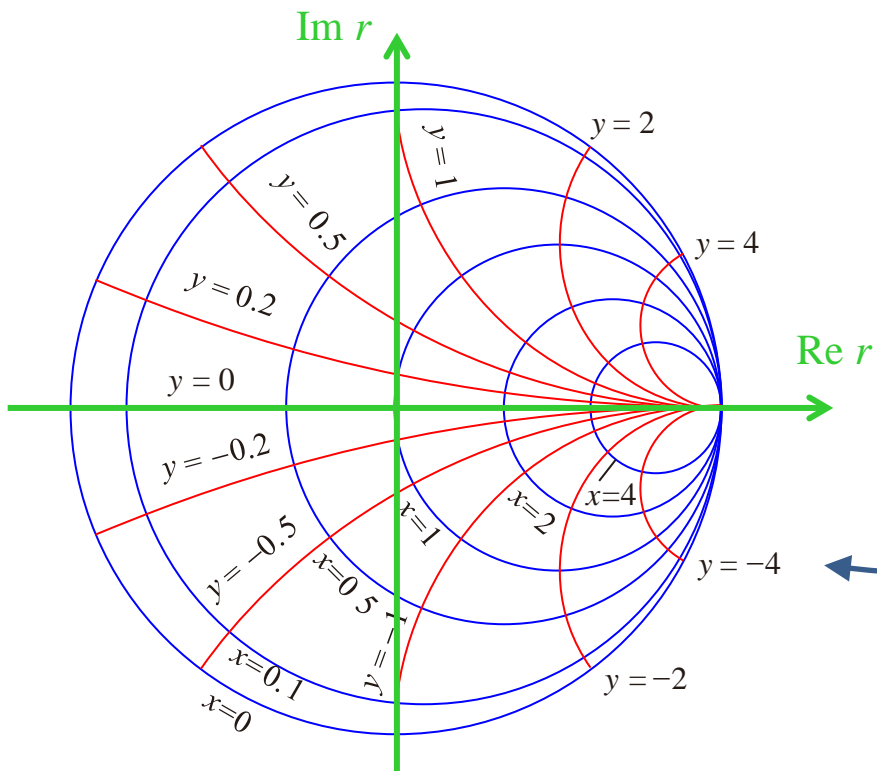
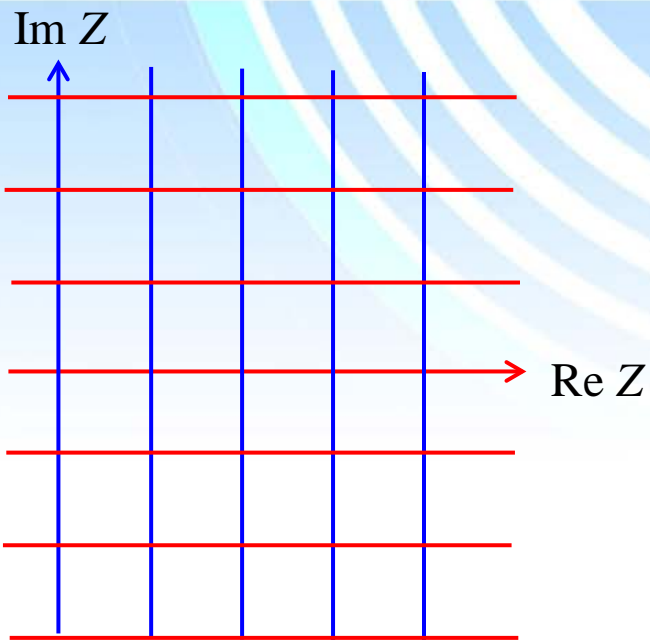
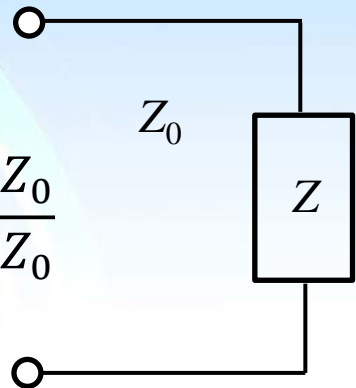
$$r = \frac{Z_0' - Z_0}{Z_0' + Z_0}$$

5.2.3 Smith chart, Immittance chart

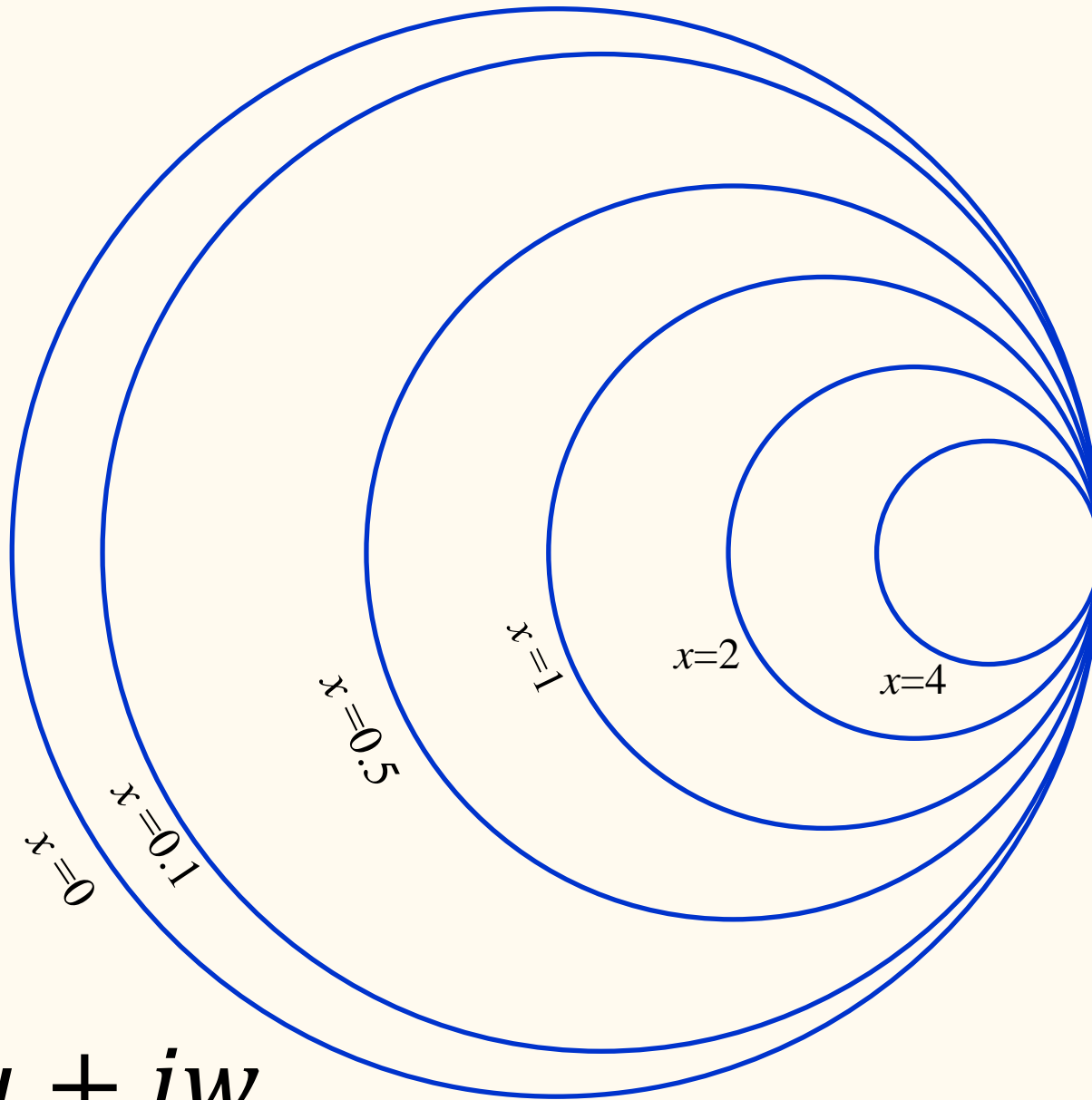
r : reflection coefficient



$$r = \frac{V_-}{V_+} = \frac{Z - Z_0}{Z + Z_0}$$

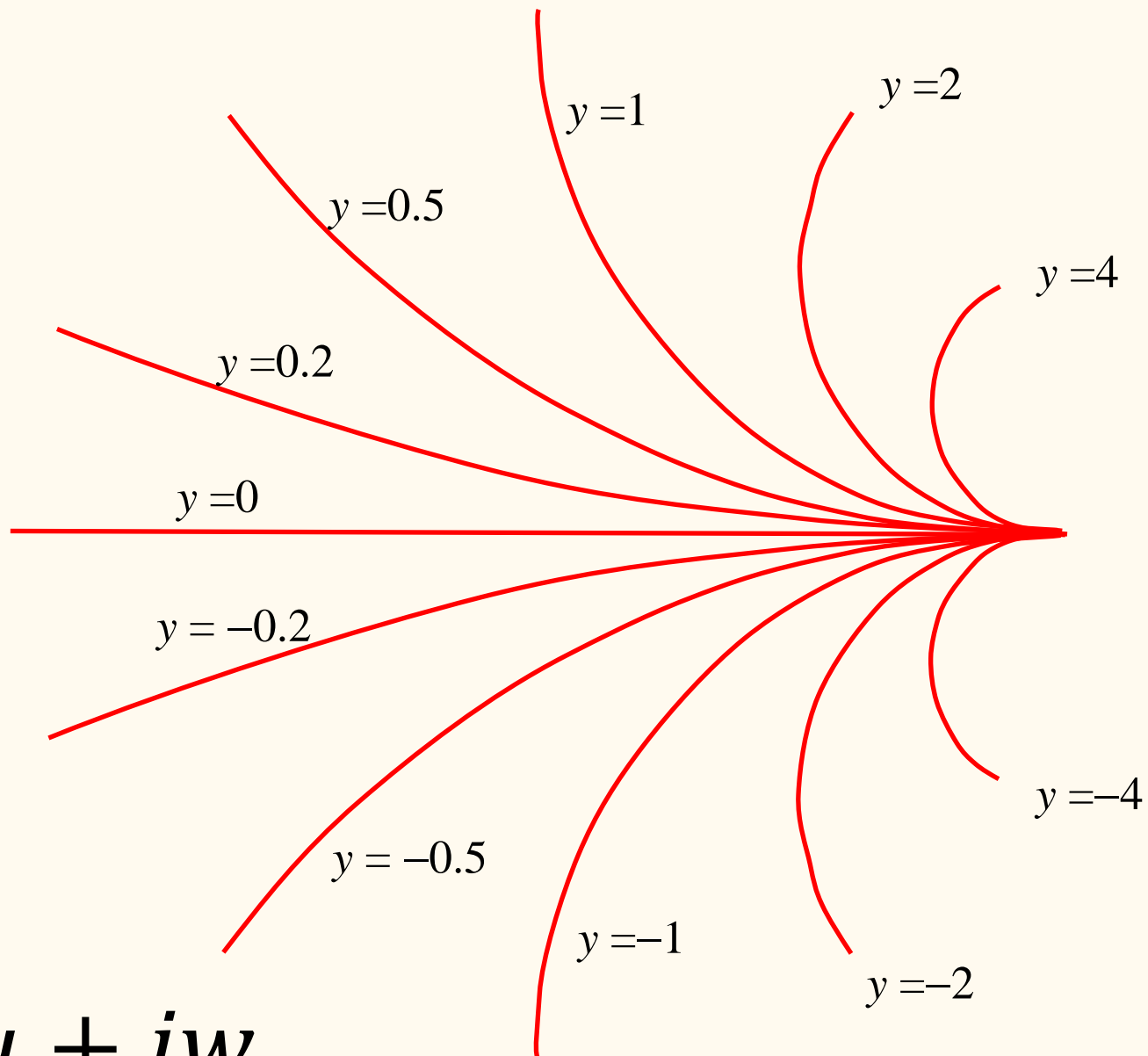


5.2.3 Smith chart, Immittance chart



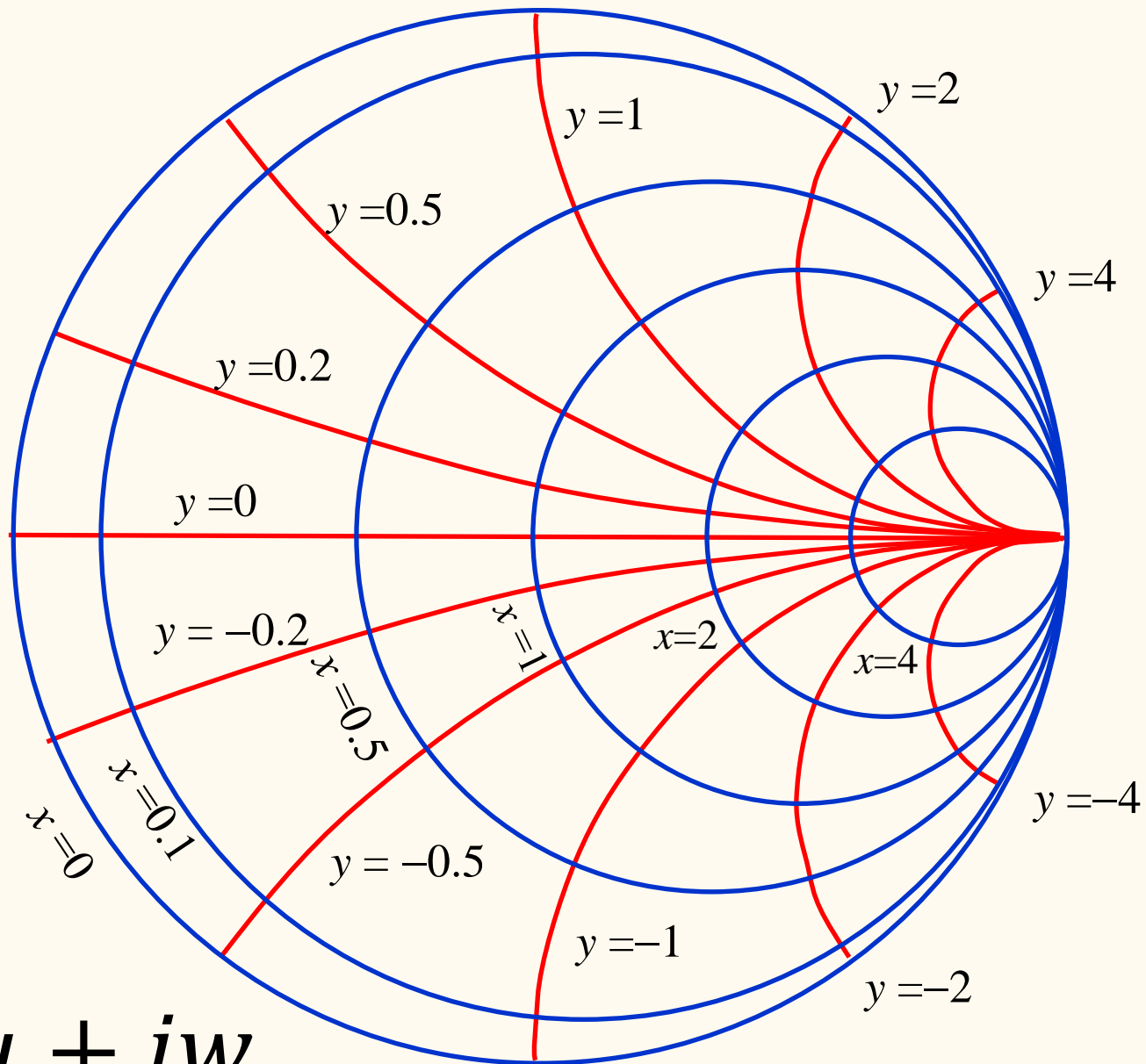
$$r = u + iw$$

5.2.3 Smith chart, Immittance chart



$$r = u + iw$$

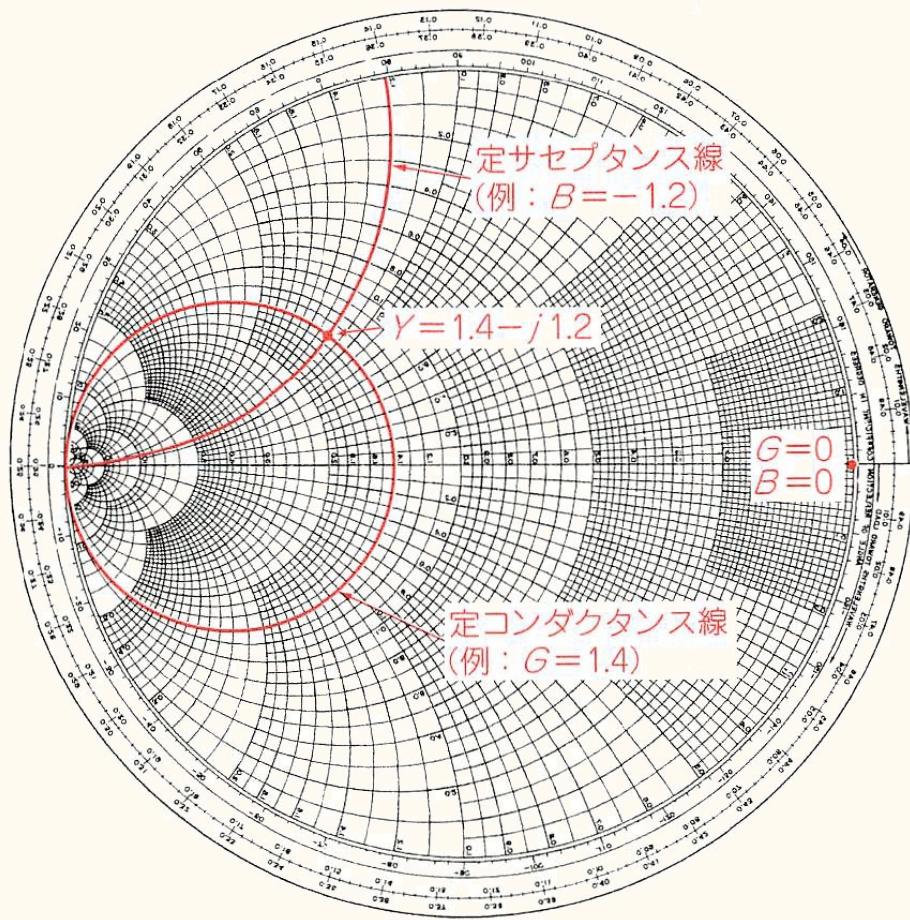
5.2.3 Smith chart, Immittance chart



$$r = u + iw$$

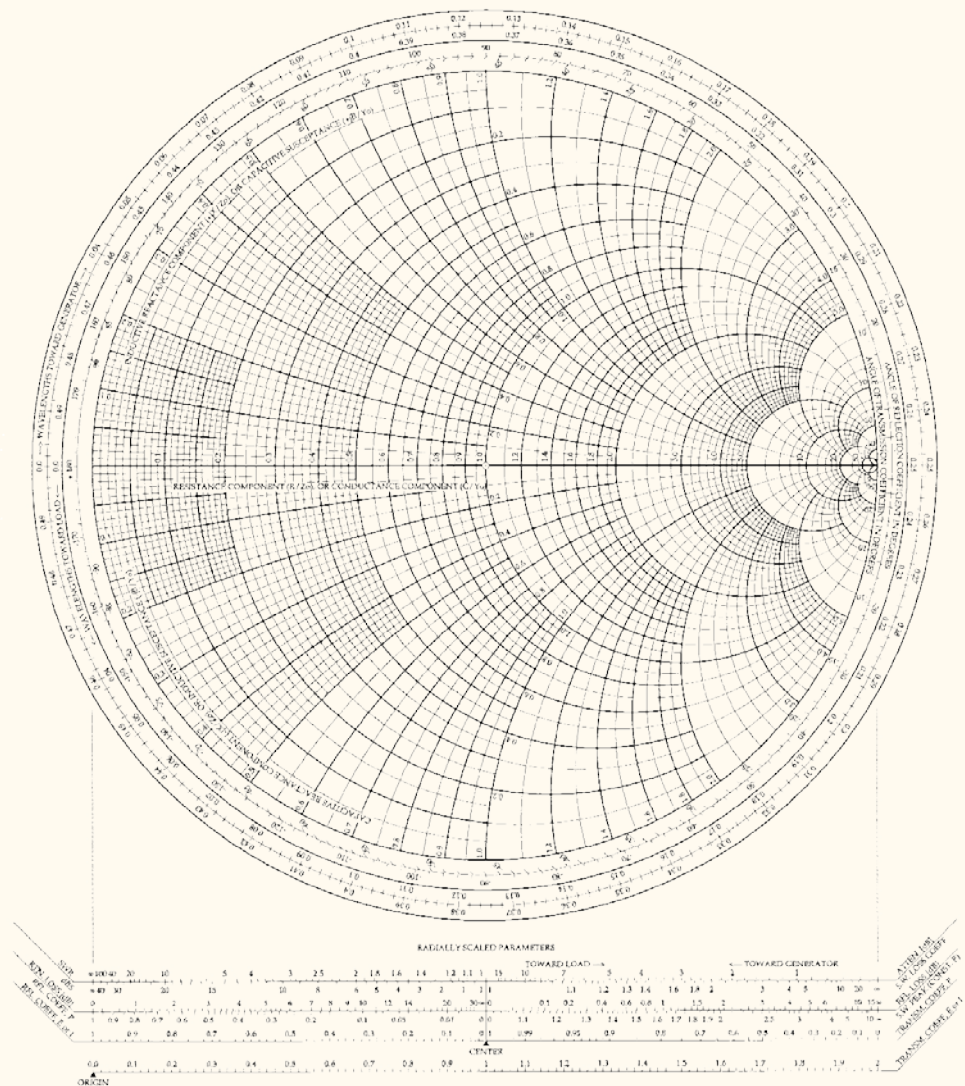
Smith chart

5.2.3 Smith chart, Immittance chart



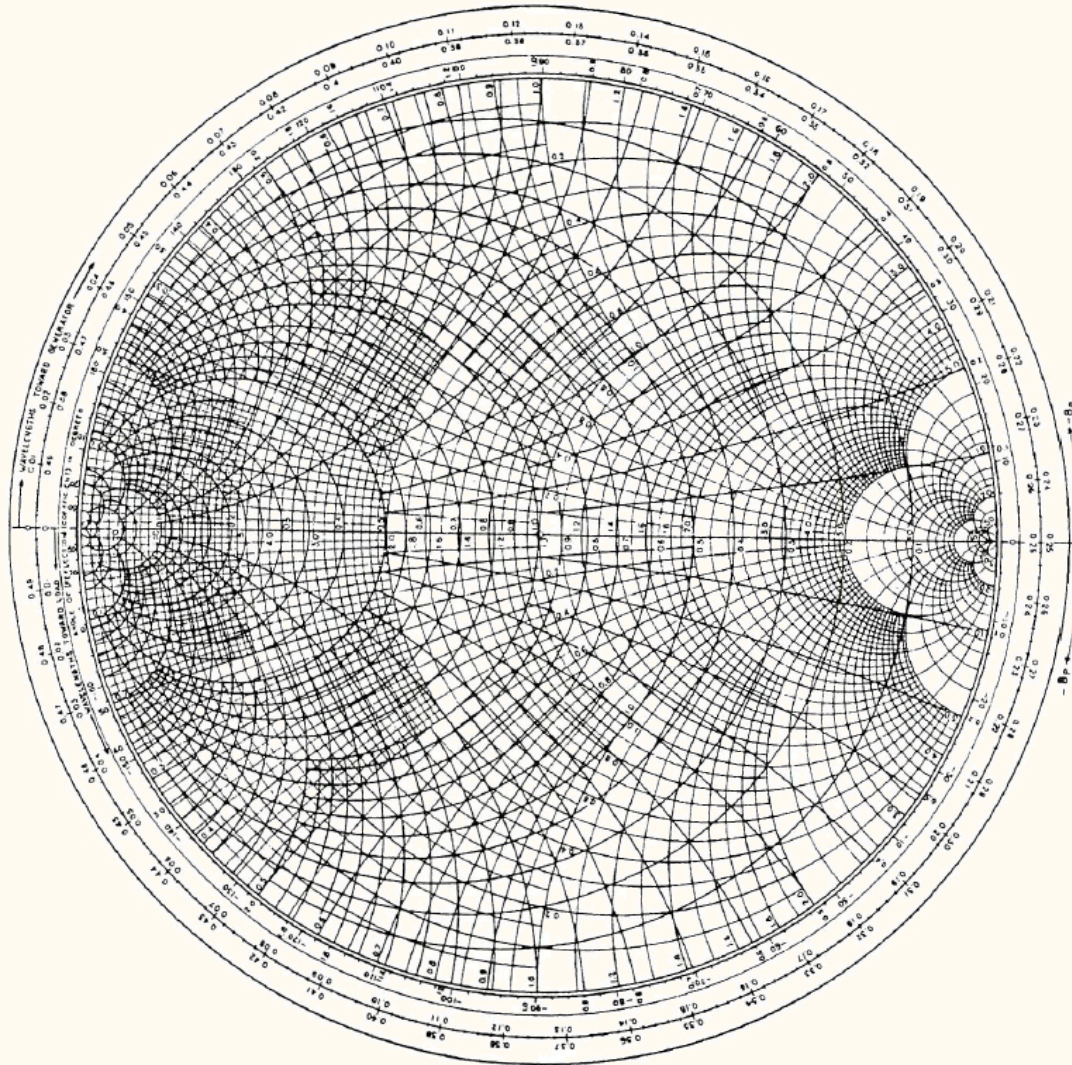
Admittance chart

$$r = u + iw$$



Smith chart

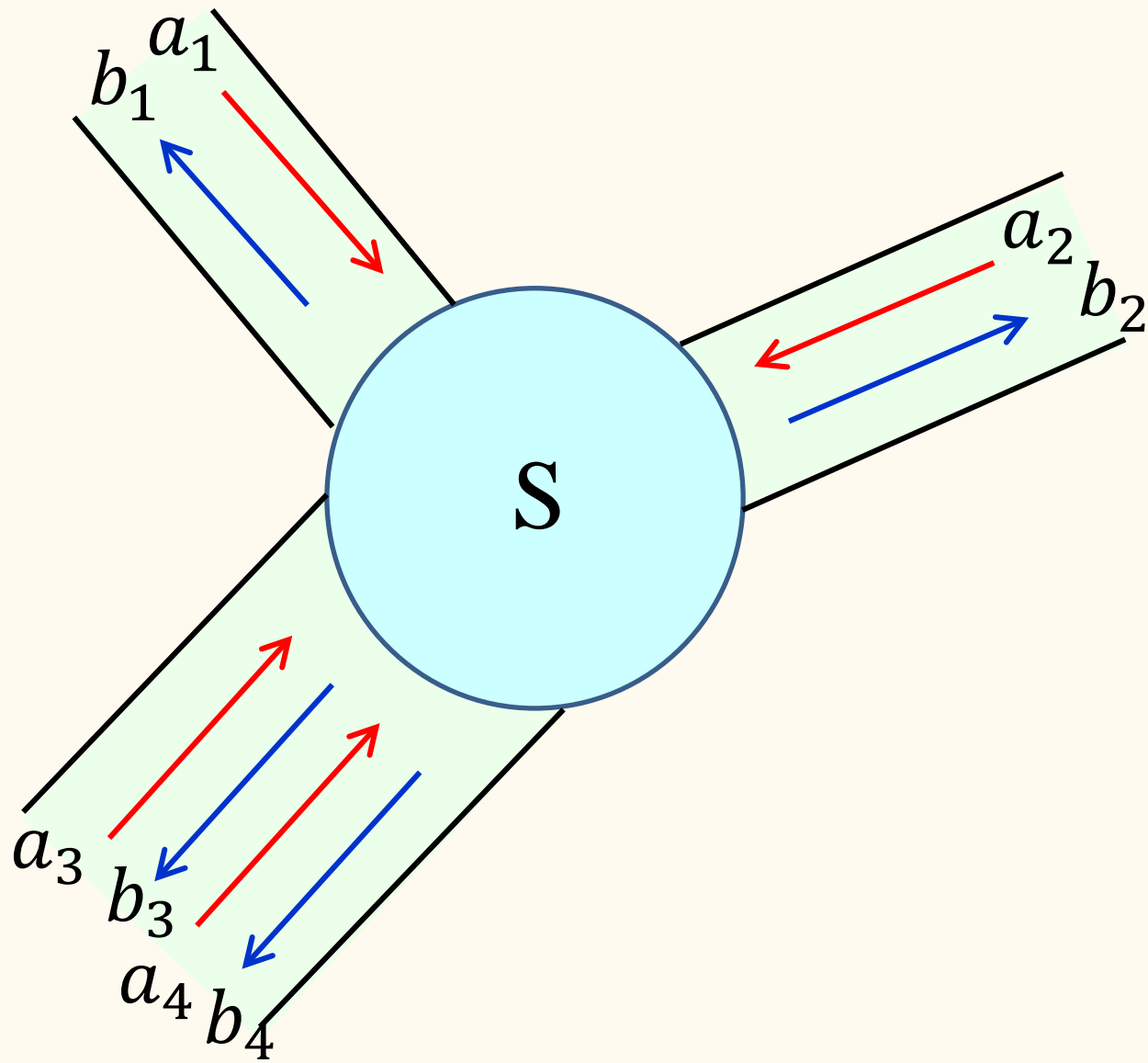
5.2.3 Smith chart, Immittance chart



Immittance chart

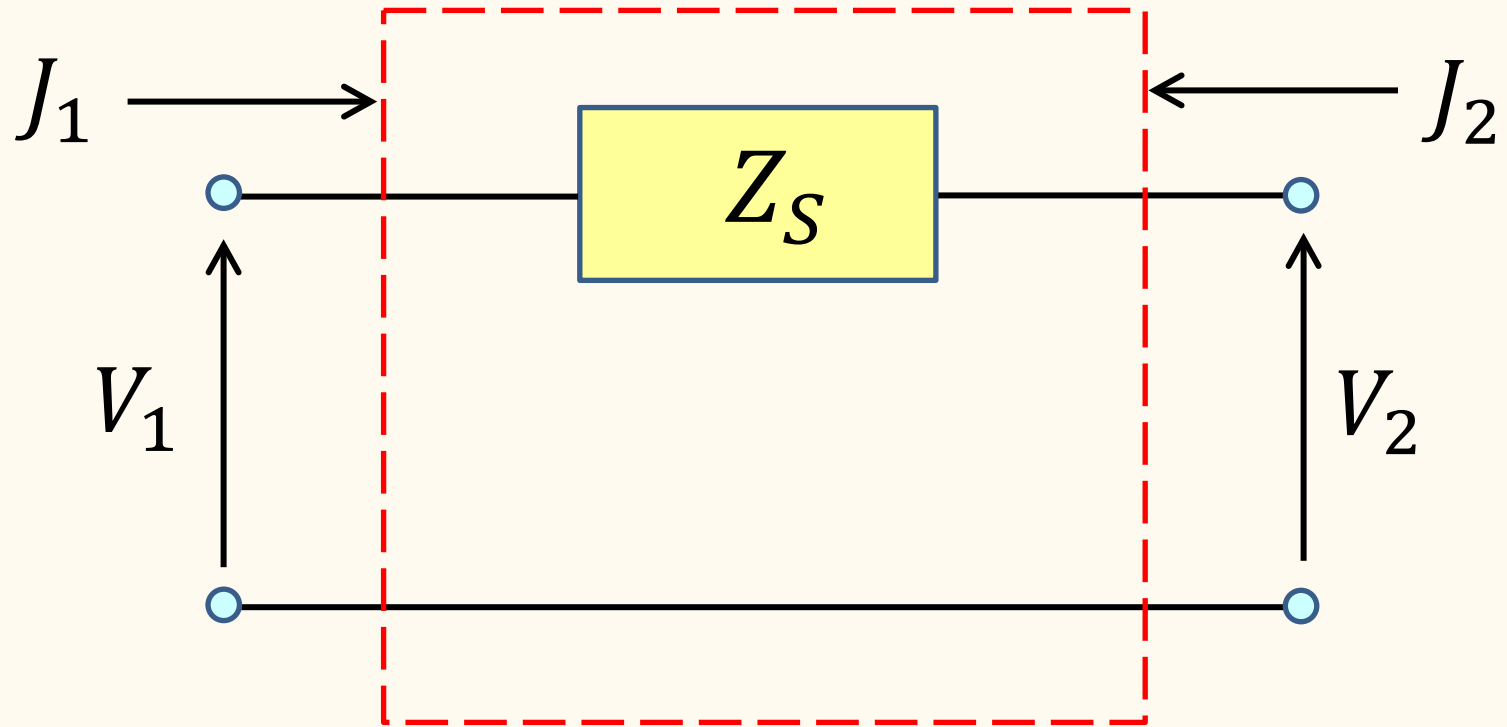
$$r = u + iw$$

5.3 S matrix (S parameters)



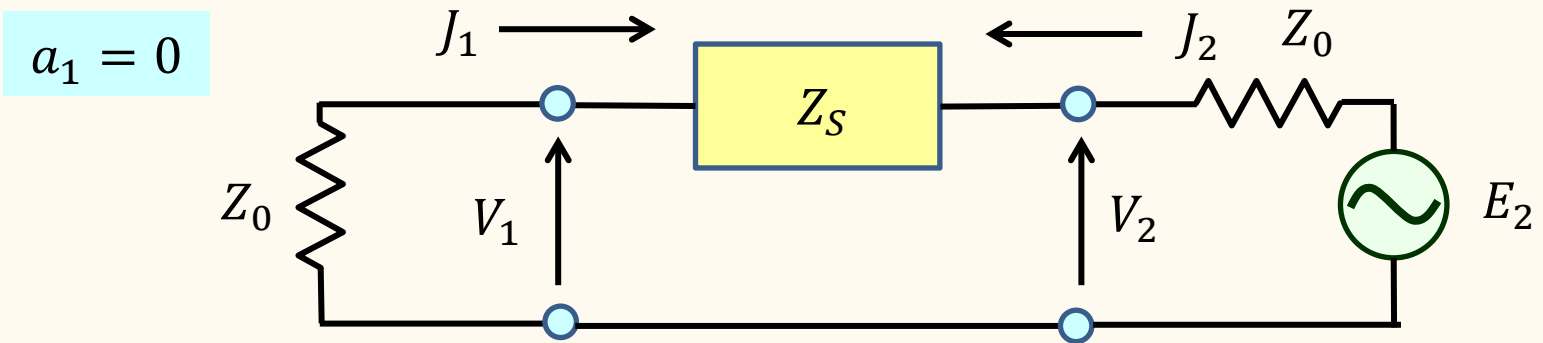
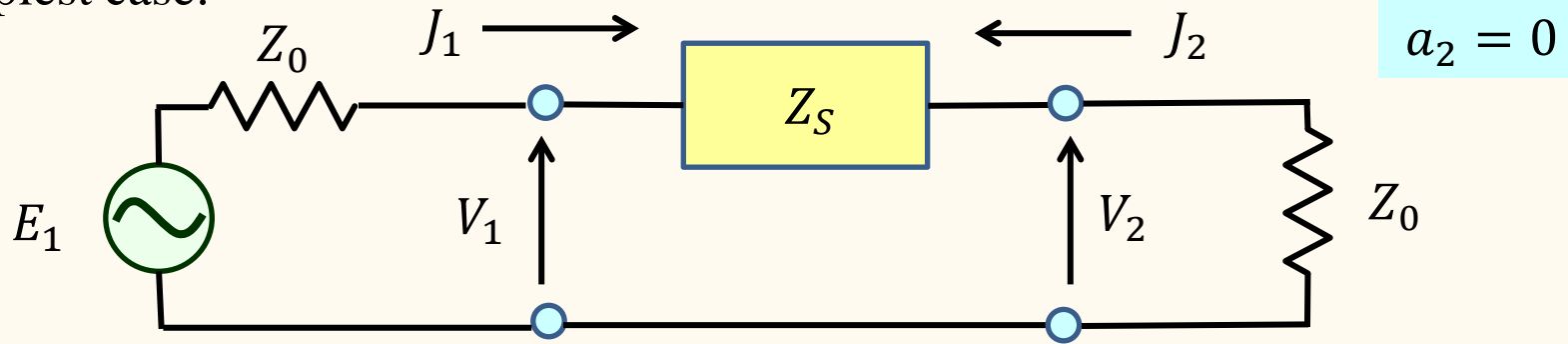
5.3 S-matrix (S-parameters)

Simplest case:

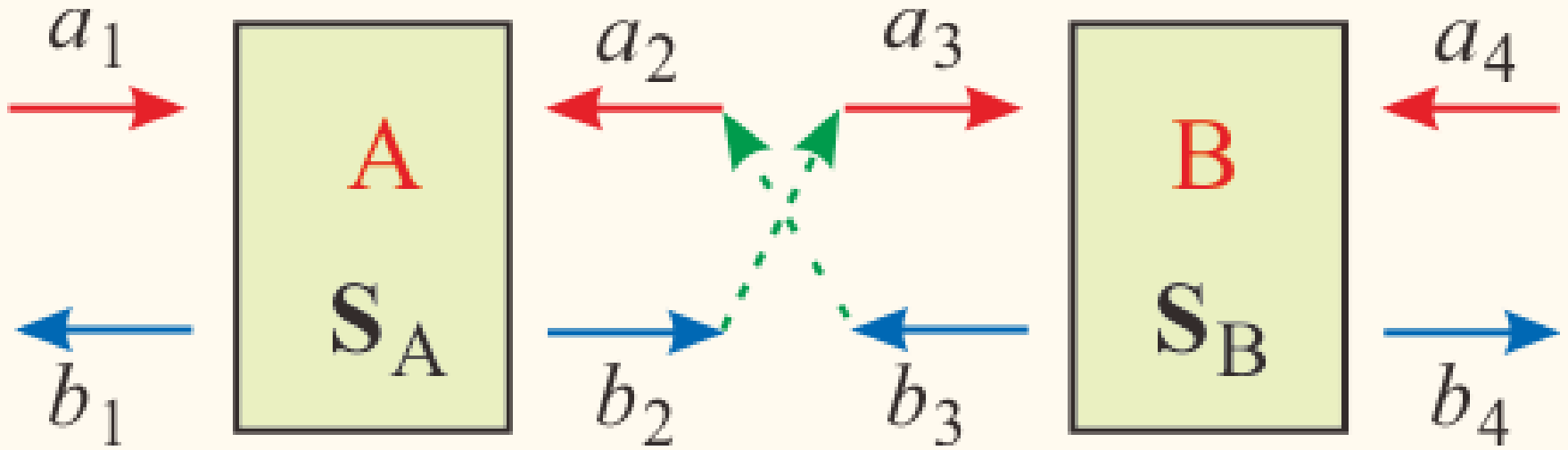
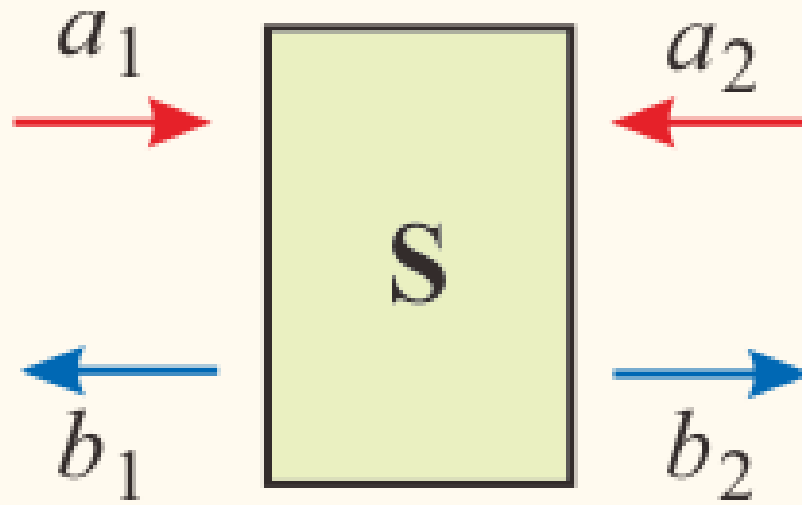


5.3 S-matrix (S-parameters)

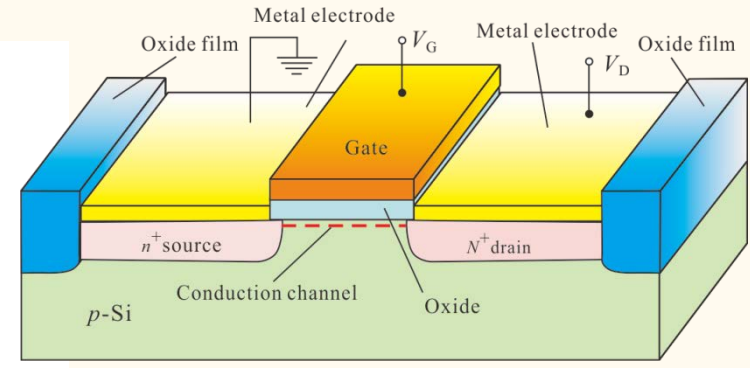
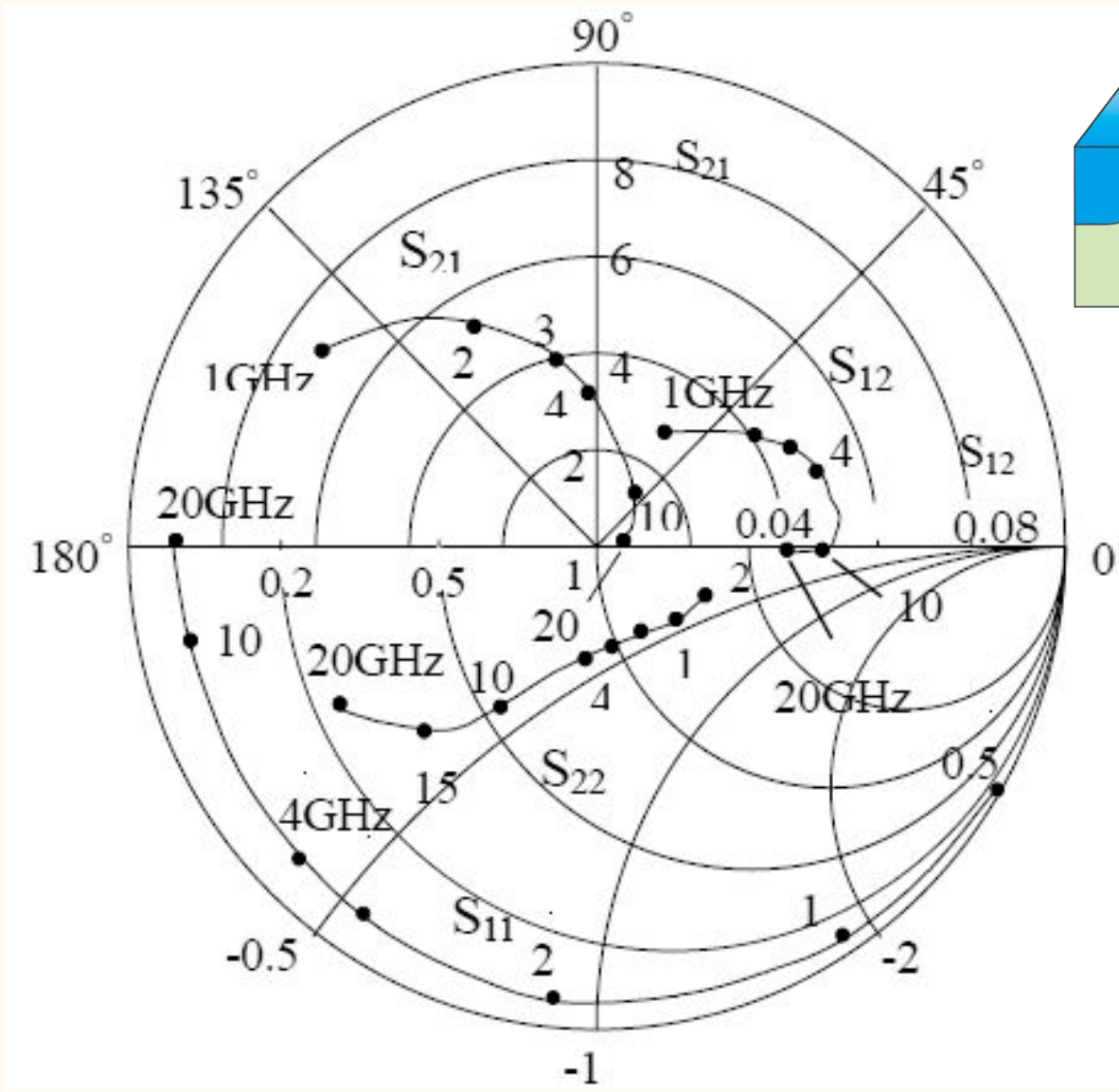
Simplest case:



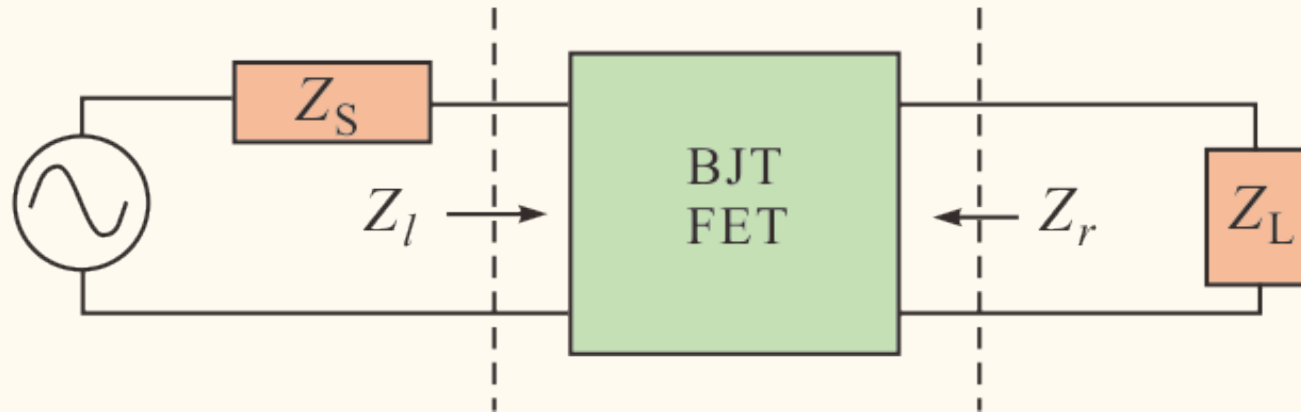
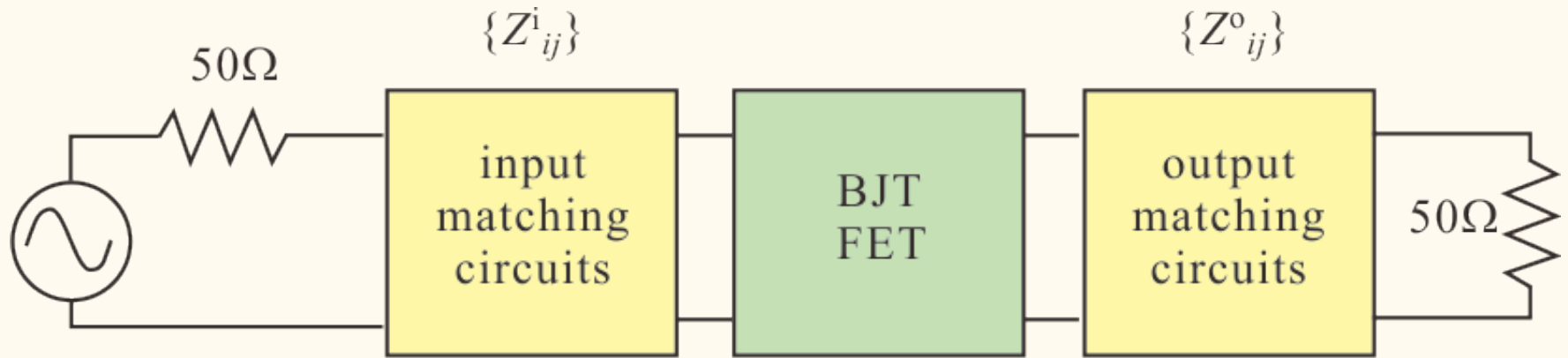
Cascade connection of S-matrices



S-parameter representation of high-frequency devices



S-parameter representation of high-frequency devices



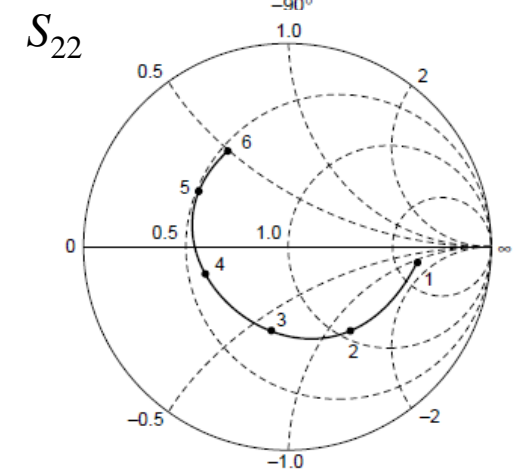
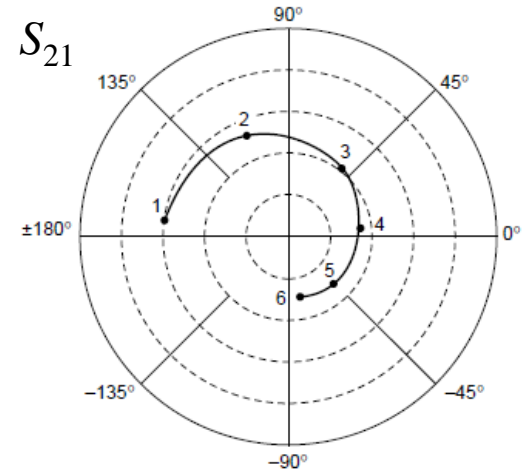
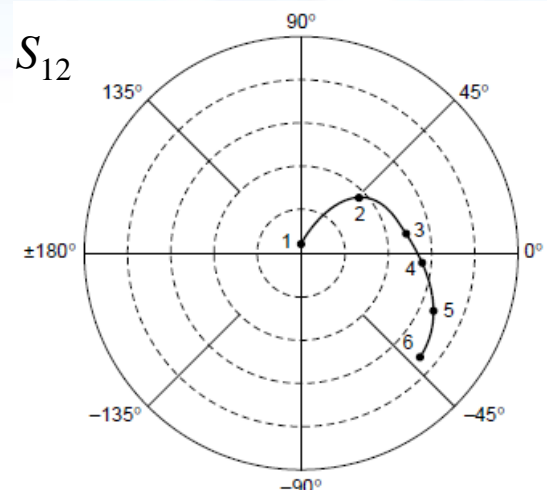
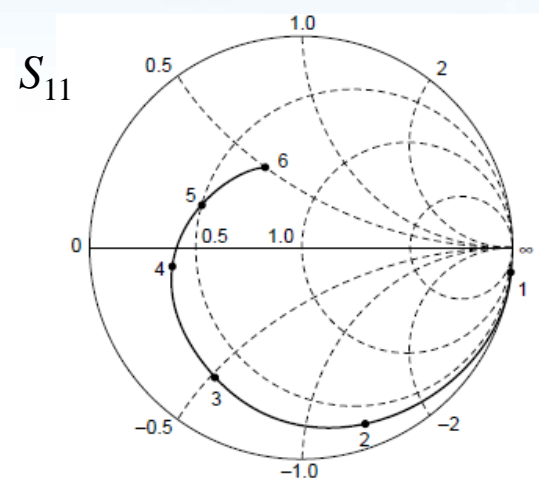
S-parameter representation of high-frequency devices



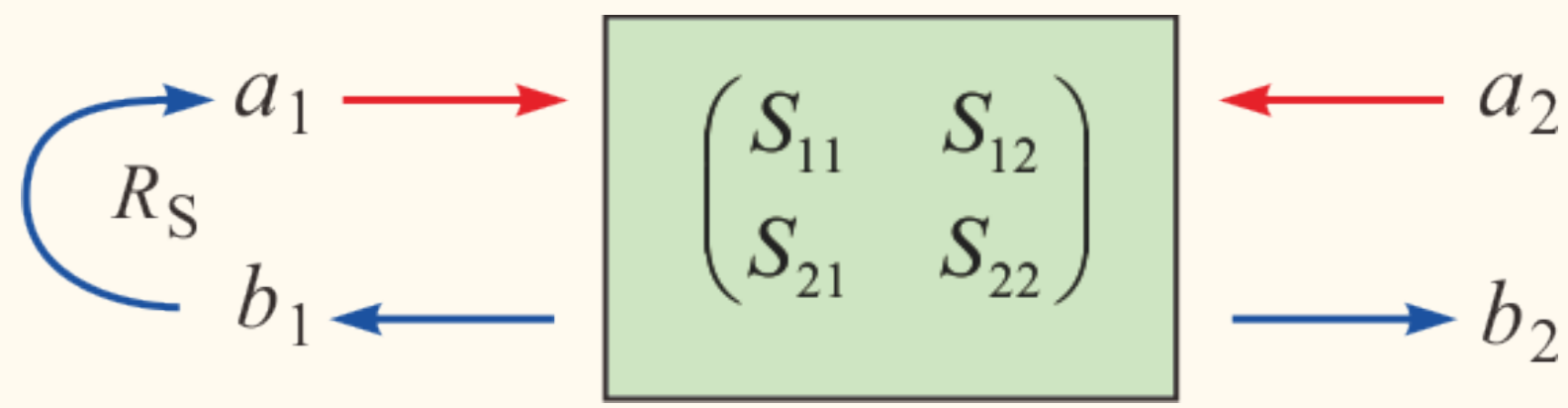
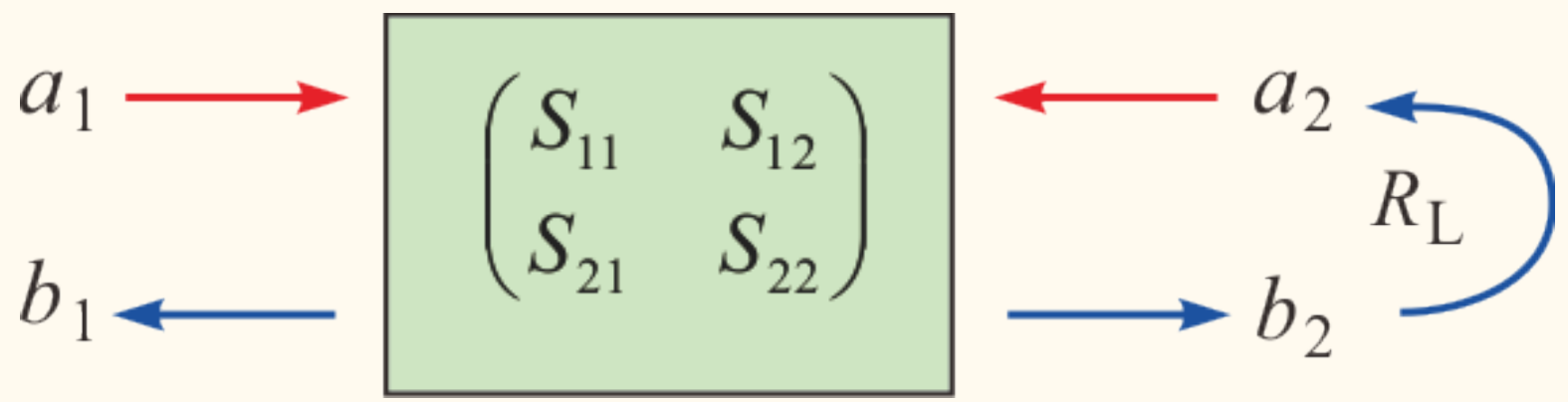
NEC	DATA SHEET
	GaAs MES FET NE76084
C to Ku BAND LOW NOISE AMPLIFIER N-CHANNEL GaAs MES FET	

S-PARAMETERS

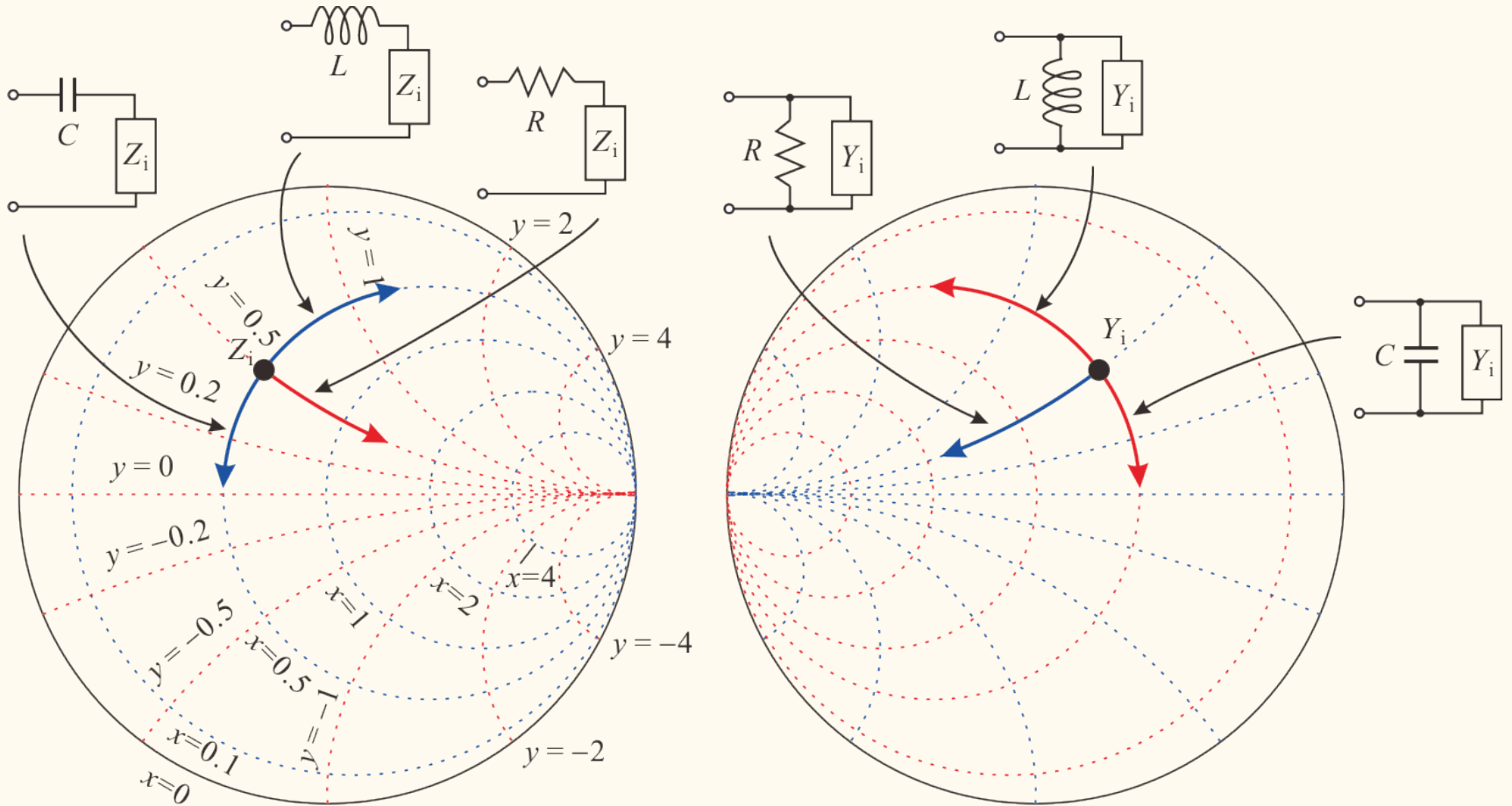
$V_{DS} = 3\text{ V}$, $I_D = 10\text{ mA}$
START 500 MHz, STOP 18 GHz, STEP 500 MHz



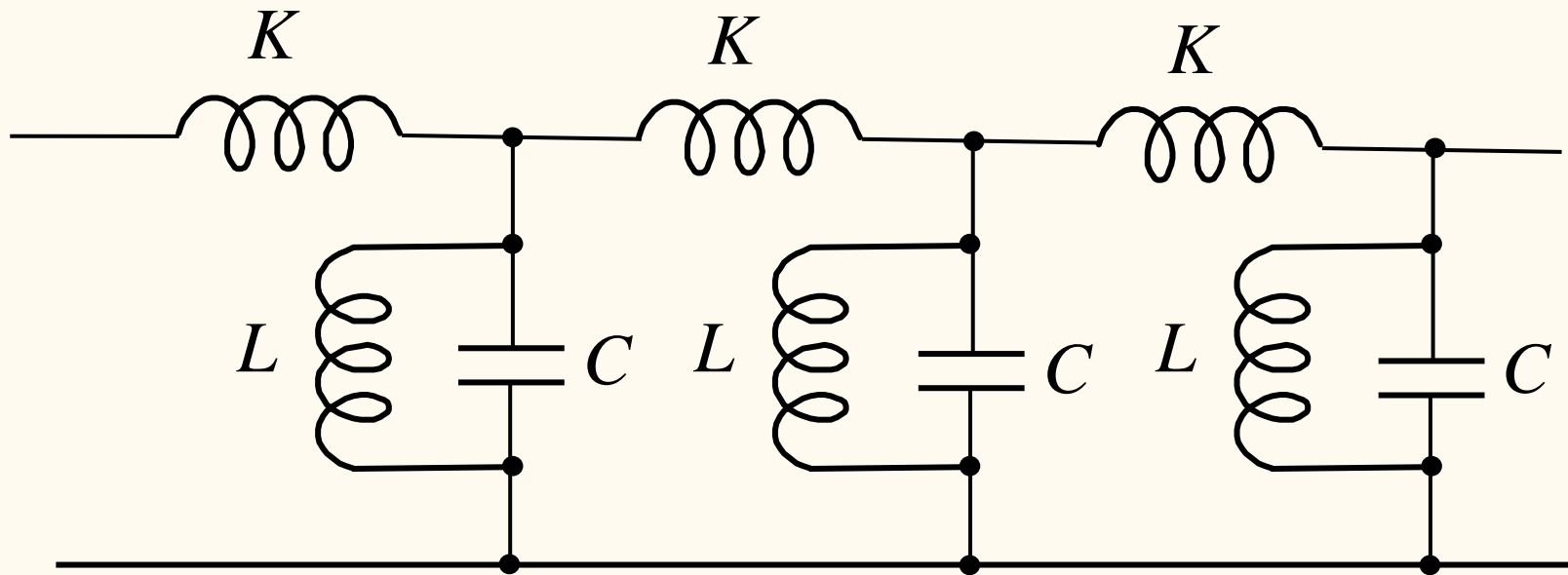
S-parameter and impedance matching



Practical impedance matching with Simth chart



5.4 Giving mass to LC transmission line



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