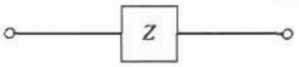
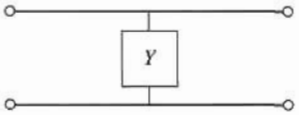
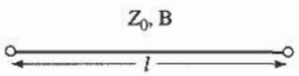
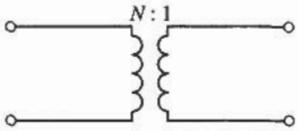
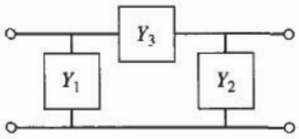
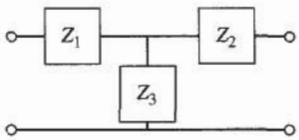
TABLE 4.1 The *ABCD* Parameters of Some Useful Two-Port Circuits

Circuit	*ABCD* Parameters	
	$A = 1$	$B = Z$
	$C = 0$	$D = 1$
	$A = 1$	$B = 0$
	$C = Y$	$D = 1$
	$A = \cos\beta\ell$	$B = jZ_0 \sin\beta\ell$
	$C = jY_0 \sin\beta\ell$	$D = \cos\beta\ell$
	$A = N$	$B = 0$
	$C = 0$	$D = \dfrac{1}{N}$
	$A = 1 + \dfrac{Y_2}{Y_3}$	$B = \dfrac{1}{Y_3}$
	$C = Y_1 + Y_2 + \dfrac{Y_1 Y_2}{Y_3}$	$D = 1 + \dfrac{Y_1}{Y_3}$
	$A = 1 + \dfrac{Z_1}{Z_3}$	$B = Z_1 + Z_2 + \dfrac{Z_1 Z_2}{Z_3}$
	$C = \dfrac{1}{Z_3}$	$D = 1 + \dfrac{Z_2}{Z_3}$

the open-circuit voltage V_2 at port 2. Thus, $A = 1$. Similarly,

$$B = \left.\frac{V_1}{I_2}\right|_{V_2=0} = \frac{V_1}{V_1/Z} = Z,$$

$$C = \left.\frac{I_1}{V_2}\right|_{I_2=0} = 0,$$

$$D = \left.\frac{I_1}{I_2}\right|_{V_2=0} = \frac{I_1}{I_1} = 1.$$

■

Relation to Impedance Matrix

Knowing the Z parameters of a network, one can determine the *ABCD* parameters. Thus, from the definition of the *ABCD* parameters in (4.63), and from the defining relations for the Z parameters of (4.25) for a two-port network with I_2 to be consistent with the sign convention used with *ABCD* parameters,

$$V_1 = I_1 Z_{11} - I_2 Z_{12}, \tag{4.66a}$$

$$V_2 = I_1 Z_{21} - I_2 Z_{22}, \tag{4.66b}$$