

Transmission Parameter

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Transmission (ABCD) Parameter

The transmission parameters are also known as:

ABCD parameter or **chain parameter** or
General circuit parameters

These are used for the analysis of the power transmission line. The output voltage and current are the independent variables using which the dependent input variables are determined. The general form of the equations for transmission parameters are:

$$(V_1, I_1) = f(V_2, -I_2) \quad (1)$$

$$V_1 = AV_2 + B(-I_2) \quad (2a)$$

$$I_1 = CV_2 + D(-I_2) \quad (2b)$$

Which can be written in the matrix form as:

$$\begin{bmatrix} V_1 \\ I_1 \end{bmatrix} = \begin{bmatrix} A & B \\ C & D \end{bmatrix} \begin{bmatrix} V_2 \\ -I_2 \end{bmatrix}$$

Determining ABCD Parameters

- Note the sign of the I_2 which is $-ve$, it indicates that the direction of the current I_2 is outward. This parameter is very useful for cascade operations.
- Determining the Transmission parameters.
- Assuming output open circuits so the $I_2=0$

$$V_1 = AV_2 \quad \text{or} \quad \mathbf{A = V_1/V_2} \quad \text{here A is Reverse voltage ratio}$$

$$I_1 = CV_2 \quad \text{or} \quad \mathbf{C = I_1/V_2} \quad \text{here C is transfer admittance}$$

Now short circuiting the output port which leads to $V_2=0$

Therefore substituting $V_2=0$ in original equation we get:

$$V_1 = -BI_2 \quad \text{or} \quad \mathbf{B = -V_1/I_2}; \quad \text{here B is Transfer impedance, o/p shorted}$$

$$I_1 = -DI_2 \quad \text{or} \quad \mathbf{D = -I_1/I_2} \quad \text{here D is reverse current ratio, o/p shorted}$$

To Summarise

$$\mathbf{A = V_1/V_2} \quad | I_2=0$$

$$\mathbf{C = I_1/V_2} \quad | I_2=0$$

$$\mathbf{B = -V_1/I_2} \quad | V_2=0$$

$$\mathbf{D = -I_1/I_2} \quad | V_2=0$$