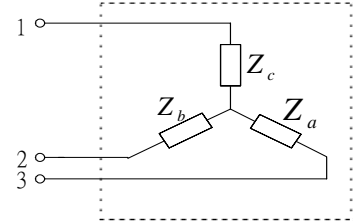
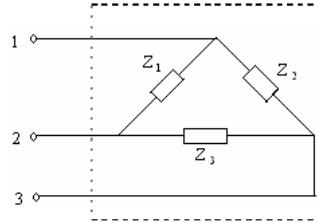


## 第二篇 阻抗轉換

### 一. $\Delta - Y$ 互換



$\Delta \rightarrow Y :$

$$Z_a = \frac{Z_2 Z_3}{Z_1 + Z_2 + Z_3}$$

$$Z_b = \frac{Z_1 Z_3}{Z_1 + Z_2 + Z_3}$$

$$Z_c = \frac{Z_1 Z_2}{Z_1 + Z_2 + Z_3}$$

$\Delta$ 型阻抗



Y型阻抗

$Y \rightarrow \Delta :$

$$Z_1 = Z_b Z_c \left( \frac{1}{Z_a} + \frac{1}{Z_b} + \frac{1}{Z_c} \right)$$

$$Z_2 = Z_a Z_c \left( \frac{1}{Z_a} + \frac{1}{Z_b} + \frac{1}{Z_c} \right)$$

$$Z_3 = Z_a Z_b \left( \frac{1}{Z_a} + \frac{1}{Z_b} + \frac{1}{Z_c} \right)$$

若  $Z_1 = Z_2 = Z_3 = Z_\Delta$

$Z_a = Z_b = Z_c = Z_Y$

則

$$Z_\Delta = 3Z_Y, \quad Z_Y = \frac{1}{3}Z_\Delta$$

## 二、電橋平衡

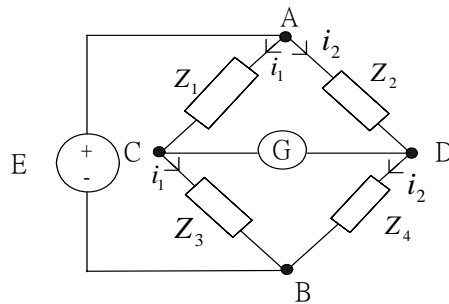
電橋平衡時檢流計無電流

$$V_{AC} = V_{AD}$$

$$i_1 Z_1 = i_2 Z_2 \quad \dots(1)$$

$$V_{CB} = V_{DB}$$

$$i_1 Z_3 = i_2 Z_4 \quad \dots(2)$$



由(1)(2) 可得電橋平衡條件

$$Z_1 Z_4 = Z_2 Z_3$$

對邊阻抗相乘=對邊阻抗相乘

阻抗:  $L \Rightarrow j\omega L(\Omega)$      $C \Rightarrow \frac{1}{j\omega C} = -j\frac{1}{\omega C}(\Omega)$      $\omega = 2\pi f$ (角頻率)