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The Choice of AC Electricity Bridge Adjustment Parameters

Zaiqi Fu, Changji Shan,Yuhui Luo & Xungang Yang
Department of Physics
Zhaotong Teacher's College
Zhaotong 657000, China
Tel: 86-870-215-3826 E-mail:zhxfzq@126.com

Abstract

It is set forth that how to choose adjustment parameters in the plural plane coordinate figure by the relation of Electricity Bridge's balance condition and adjustment parameters.

Keywords: Adjustment parameters, Choice, Balance

On the discussion of AC electricity bridge in some schoolbooks and correlated datum, it has been put forward that how to choose some quantities as adjustment parameters or the selected adjustment parameters from the observed quantities which have been discriminated reading. The new viewpoint is brought forward that how to choose the adjustment parameters by the point of view of adjustment velocity.

1. The Balance Condition of AC Electricity Bridge

The balance process of AC electricity bridge is decided by the change of eqn(1) .Because Z_1, Z_2,Z_3,Z_4 are composed of resistance,apacitance and inductance which are parallel connection or in series,xcept the observed parameters, the others quantities can be regarded as adjustment parameters.

$P=Z_2Z_3-Z_1Z_4=a+jb$ (1)

It is shown by eqn(1) that the two quantities at least are chosen as adjustment parameters for a and b=0 together.If three or the more quantities are chosen,hen adjustment times is nimiety,he balance process can be very much trouble.In the most things, two quantities are chosen as adjustment parameters.

The selections have more groups.Some groups can not attain the balance of electricity bridge;some groups may attain the aim,but nimiety.It is the best choice that not only some groups may attain the balance but also the adjustment times are few.The article will set forth how to choose correct adjustment parameters quickly through the frequent used AC electricity bridge.

2. The Quickly Chosen of AC Electricity Bridge Adjustment Parameters

At the balance point of electricity bridge,the relation of a,b and adjustment parameters may be expressed by parallel beeline family[3].The more nearly 90^0 of two parameter beeline angle, the more quickly of balance speed. It can be shown that which parameter beeline are perpendicularity or parallelism one another. The best choice is two parameters of perpendicularity, not parallelism.Without parameters of perpendicularity, the best seemliness choice is two parameters which angle is rather big.

2.1 Capacitance Electricity Bridge

According to Fig.2,it is shown the expression formula of a and b are eqn(2) and eqn(3) separated by the eqn(1).The beelines of each parameters are shown in Fig.3.It is the best choice that R_2 and C_2 are adjustment parameters ,as shown in Fig.3.

$a=R_xR_3-R_4R_2$ (2) $b=\frac{R_4}{C_2\omega}-\frac{R_3}{C_x\omega}$ (3)

2.2 Inductance Compare Electricity Bridge

According to Fig.4,it is shown the expression formula of a and b are eqn(4) and eqn(5) separated by the eqn(1).The beelines of each parameters are shown in Fig.5.It is the best choice that R_2 and L_2 are adjustment parameters ,as shown in Fig.5.

$a=R_xR_3-R_2R_4$ (4) $b=L_xR_3\omega-L_2R_3\omega$ (5)

2.3 Schering Electricity Bridge

According to Fig.6,it is shown the expression formula of a and b are eqn(6) and eqn(7) separated by the eqn(1).The beelines of each parameters are shown in Fig.7. Because the angle of R_3 and C_3 is rather big,it is the best choice that R_3 and C_3 are

adjustment parameters ,as shown in Fig.7.

$$a=\frac{R_x R_3}{1+(R_3C_3\omega)^2}-\frac{R_3^2C_3\omega}{C_x\omega[1+(R_3C_3\omega)^2]} \quad (6)$$

$$b=\frac{R_2}{C_4\omega}-\frac{R_xR_3^2C_3\omega}{1+(R_3C_3\omega)^2}-\frac{R_3}{C_x\omega[1+(R_3C_3\omega)^2]} \quad (7)$$

2.4 Maxwell Electricity Bridge

According to Fig.8,it is shown the expression formula of a and b are eqn(8) and eqn(9) separated by the eqn(1).The beelines of each parameters are shown in Fig.9.Because the angle of R_3 and C_3 is rather big,it is the best choice that R_3 and C_3 are adjustment parameters ,as shown in Fig.9.

$$a=\frac{R_3(R_x+R_3C_3\omega^2L_x)}{1+(R_3C_3\omega)^2}-R_2R_4 \quad (8) \qquad b=\frac{R_3(L_x\omega-R_xR_3C_3\omega)}{1+(R_3C_3\omega)^2} \quad (9)$$

For the complex AC Electricity Bridge, it is difficult to ascertain the relation which a and b change with some parameter varying. At the time ,it may be judged by the software of origin.

3. Conclusion

First, the each parameters are done in the coordinate chart of a and jb,then according to the angle between the beelines,it is a convenience method to choose perpendicularity or bigger angle as the adjustment parameter.

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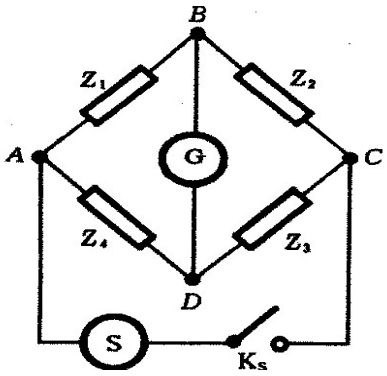

Figure 1. Electricit Bridge Circuitry

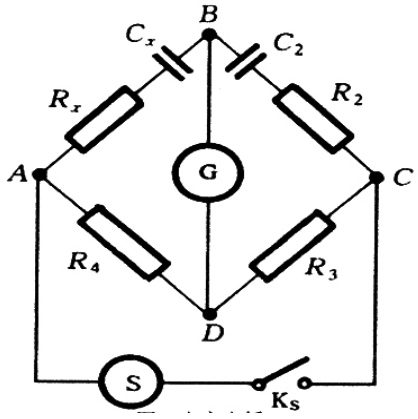

Figure 2. Capacitance electricity bridge

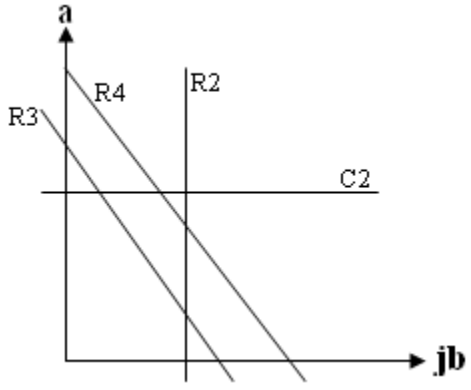

Figure 3. The beeline chart of Capacitance electricity bridge parameter

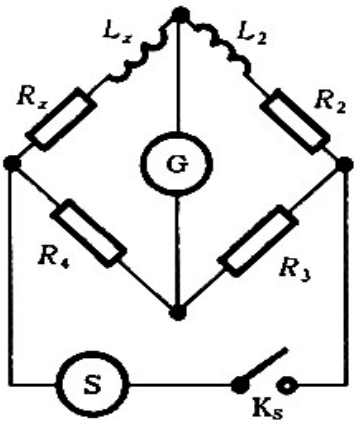

Figure 4. Inductance Compare Electricity Bridge

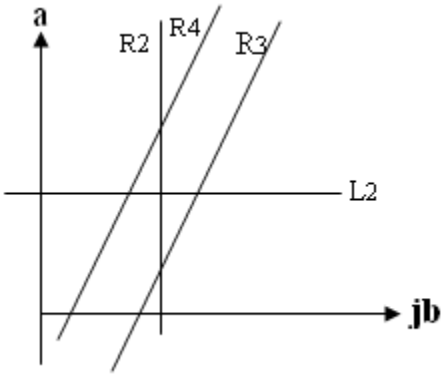

Figure 5. The beeline chart of Inductance Compare bridge parameter

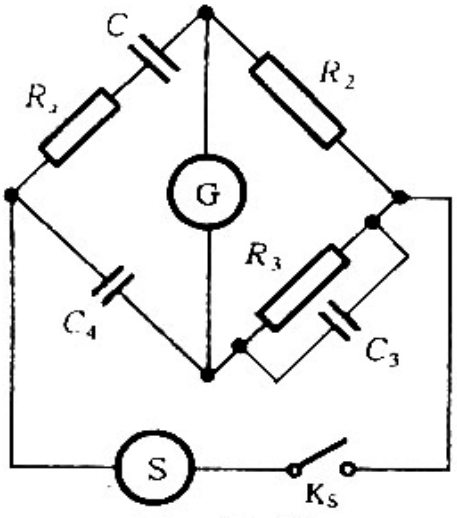

Figure 6. Schering Electricity Bridge

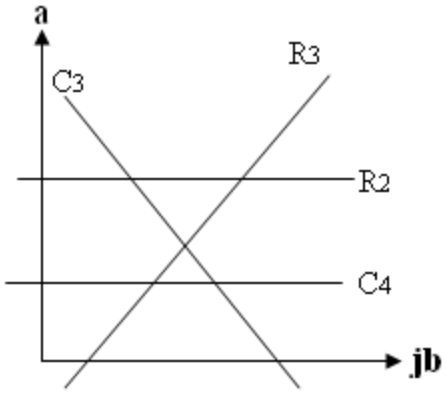

Figure 7. The beeline chart of Schering Electricity Bridge Parameter

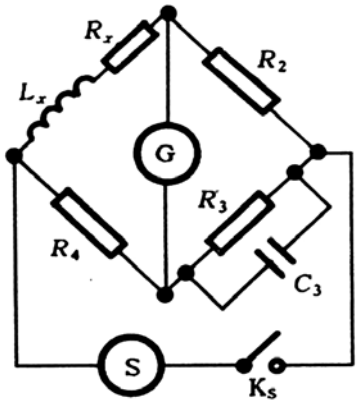

Figure 8. Maxwell Electricity Bridge

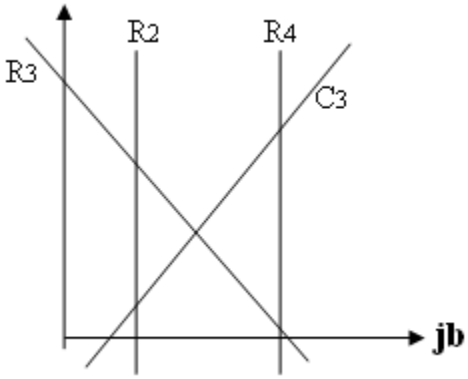

Figure 9. The beeline chart of Maxwell Electricity Bridge Parameter