Measurement of Capacitance by Schering Bridge

Aim:

Objective:

- To Determine the Capacitance of an unknown Capacitor.

Theory:

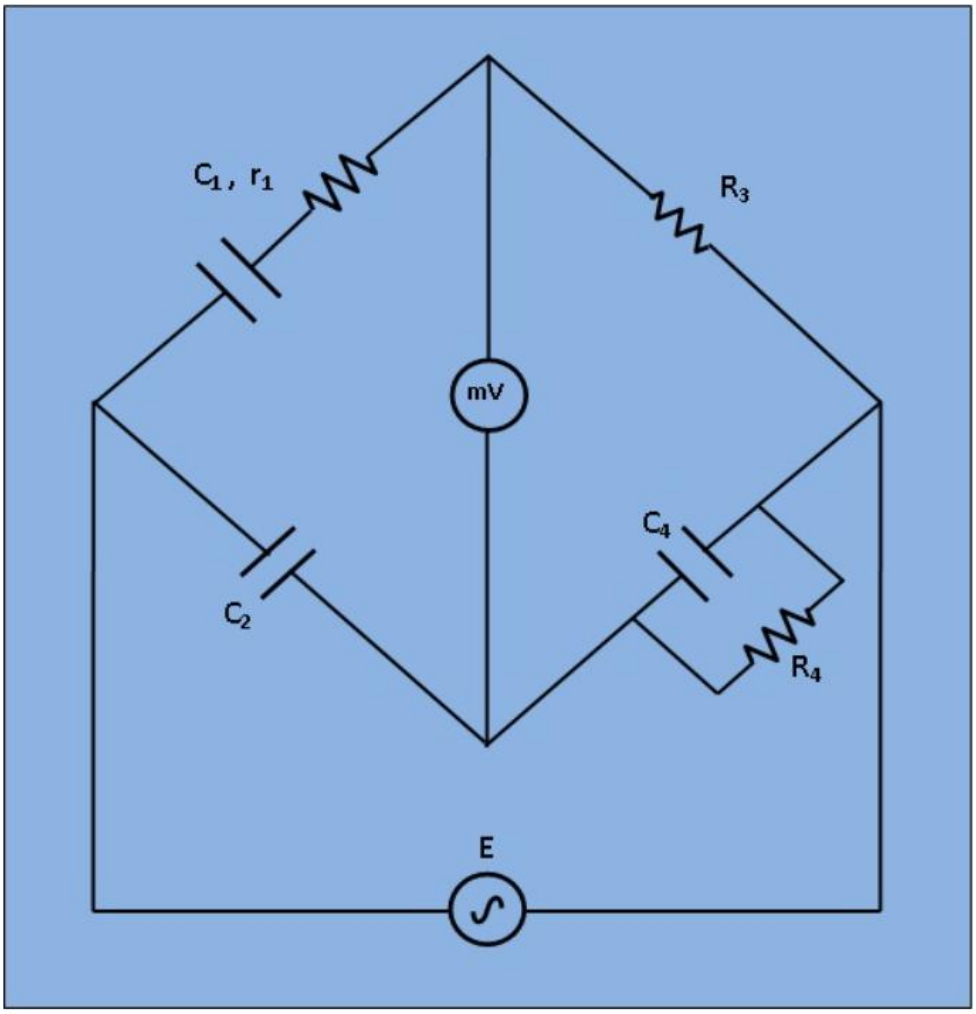


Fig 1: Circuit diagram for measurement of Capacitance by Schering Bridge

Let,
C1=capacitor whose capacitance is to be measured.

r1= a series resistance representing the loss in the capacitor C1.

C2= a standard capacitor.

R3= a non inductive resistance.

C4= a variable capacitor.

R4= a variable non inductive resistance.

At balance,

$$(r_1 + \frac{1}{j\omega C_1}) * (\frac{R_4}{j\omega C_4 R_4 + 1}) = \frac{R_3}{j\omega C_2} \ldots\ldots (1)$$

$$r_1 R_4 - \frac{jR_4}{\omega C_1} = -\frac{jR_3}{\omega C_2} + \frac{R_3 R_4 C_4}{C_2} \ldots\ldots (2)$$

Or Equating the real and imaginary terms in equa. (2), we obtain

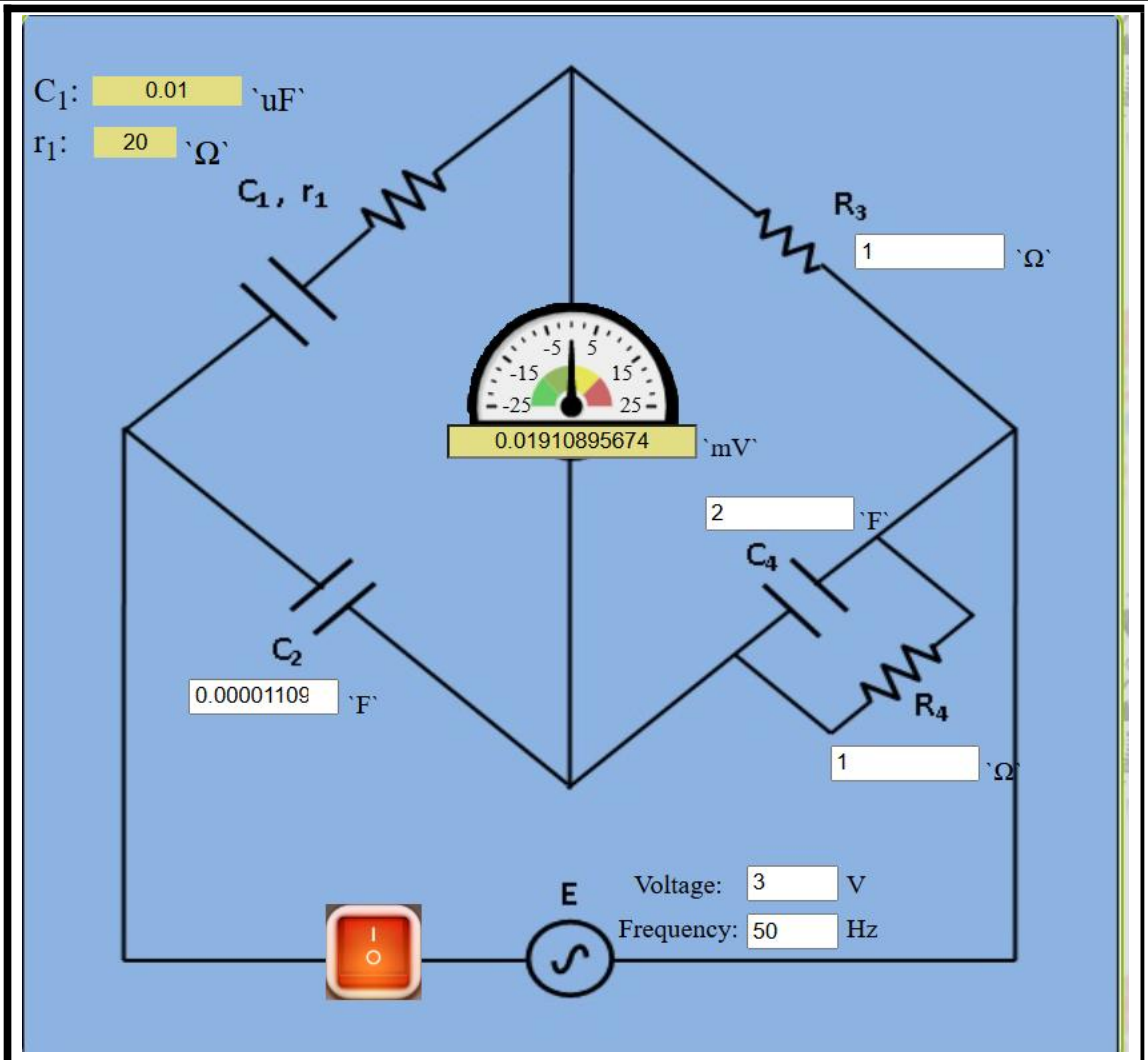
$$r_1 = R_3 * \frac{C_4}{C_2} \ldots\ldots (3)$$

$$C_1 = R_4 * \frac{C_2}{R_3} \ldots\ldots (4)$$

And, Two independent balance equations (3) and (4) are obatined if C4 and R4 are chosen as the variable elements.
Dissipation factor

$$D_1 = \omega C_1 r_1 \ldots\ldots (5)$$

Simulation:



The current voltmeter reading is: 0.0191089567 mv. Now simulate to get:

Capacitor value (in uF): 11.093

Resistance value (in Ω): 1.8029e+5

Dissipation Factor: 628.00

Simulate

Result:

Thus the unknown capacitance is found using schering bridge