Circuit Breakers

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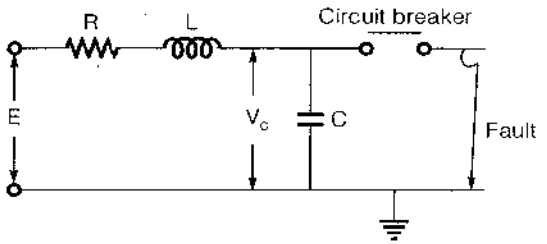
- **Restriking voltage**



$$V = E\left(1 - \cos\frac{1}{\sqrt{LC}}t\right)$$

where, L, C = Inductance and capacitance per phase of the system upto the point of circuit breaker location.

E = System voltage at the instant of arc interruption

V = Restriking voltage

- **The maximum value of restriking voltage = 2 x E_{peak}**

  where, E_{peak} = Peak value of the system voltage

- **Natural frequency of oscillation**

$$f_n = \frac{1}{2\pi}\frac{1}{\sqrt{LC}}$$

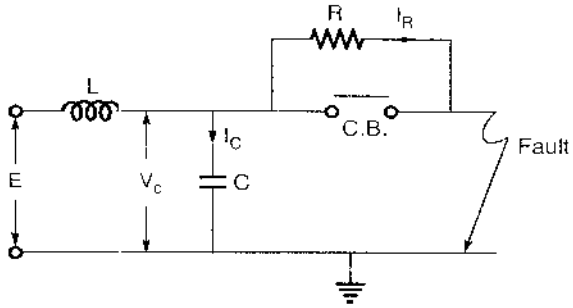
- **Rate of rise of restriking voltage (RRRV)**

$$RRRV = \omega_n E \sin\omega_n t$$

- **The maximum value of RRRV = $\omega_n E_{peak}$**

Resistance Switching

- Frequency of damped oscillation

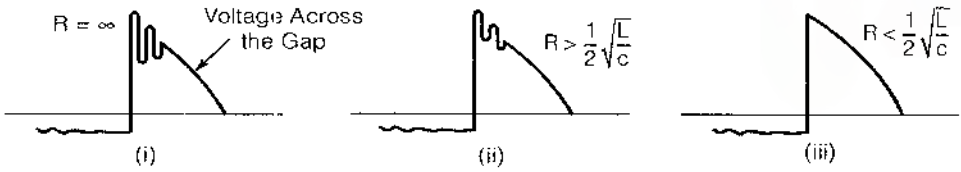


$$f = \frac{1}{2\pi}\sqrt{\frac{1}{LC} - \frac{1}{4R^2C^2}}$$

Note:

If value of the resistance connected across the contacts of circuit breaker, is equal to or less than $\frac{1}{2}\sqrt{\frac{L}{C}}$, then there will be no transient oscillation.

Transient Oscillation for Different Values of R



Transient oscilations for different values of R

- If $R > \frac{1}{2}\sqrt{\frac{L}{C}}$. There will be oscillation.
- $R = \frac{1}{2}\sqrt{\frac{L}{C}}$ is known as critical resistance. There will be no oscillation.

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