*International Journal of Engineering Applied Sciences and Technology, 2024*
**Vol. 8, Issue 10, ISSN No. 2455-2143, Pages 109-112**
**Published Online February 2024 in IJEAST (http://www.ijeast.com)**

# ANALYSIS OF R, L, C AC CIRCUITS BY MATLAB SIMULATION

Mr. Jayesh. M. Suryawanshi
Department Of Electrical Engineering
R. C. Patel Polytechnic, Shirpur, Dhule, Maharashtra, India

Ms. Rajeshri R. Pawar
Department of E&Tc Engineering
Ahinsa Poly. Dondaicha, Dhule, Maharashtra, India

*Abstract—* **In this paper Resistive, Inductive, Capacitive ac circuits response about voltage and current. For pure resistive circuit voltage and current are in-phase, for pure inductive circuit current lags to voltage and for pure capacitive circuit current leads to voltage, this phenomenon exactly match with the simulation result with the help of MATLAB.**

*Keywords—* **Resistive, Inductive, Capacitive ac circuits, MATLAB.**

## I. INTRODUCTION

We know the concept of Resistance of circuit is defines as the opposition to the flow electric current, Inductance is define which oppose to change in current, capacitance is define as the oppose to change in voltage.
Also inductor which store the electrical energy in the form of magnetic field, and capacitor which store the electrical energy in the form electrostatic field.
Active power is defined as the product of voltage and current and cosine angle between voltage and current.
Reactive Power is defined as product of voltage and current and sine angle between voltage and current.
Apparent power is defined as the product of rms voltage and rms current.

## II. PROPOSED THEORY

**Derivation of Pure Resistive circuit, Inductive Circuit, Capacitive circuit**
**A.- Pure Resistive Circuit**
In this circuit voltage source is connected across the pure resistance , Due this instantaneous voltage source instantaneous current flowing through the circuit, due to this current voltage drop across resistance

$$V_R = I * R$$

Voltage equation : V= Vm sin(wt) Current equation: I= Im sin(wt)

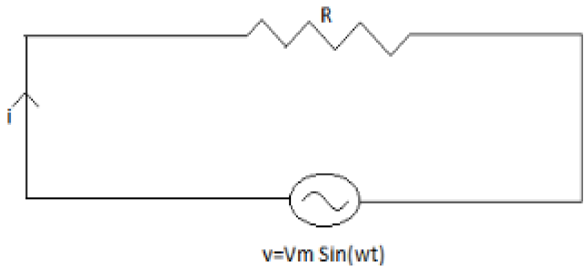


Fig. 1. Pure Resistive AC Circuit


Fig. 2. Phasor Representation

In pure resistive circuit current and voltage are in phase. Means phase difference between voltage and current is zero.

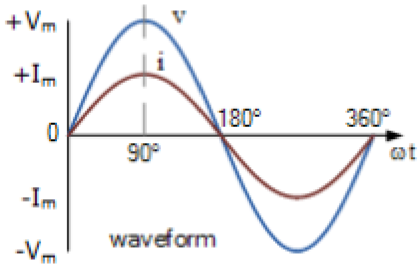


Fig. 3. Waveform

Voltage equation :
V= Vm sin(wt)
Current equation:
I= Im sin(wt)

International Journal of Engineering Applied Sciences and Technology, 2024
Vol. 8, Issue 10, ISSN No. 2455-2143, Pages 109-112
Published Online February 2024 in IJEAST (http://www.ijeast.com)

**B. Pure Inductive Circuit –**

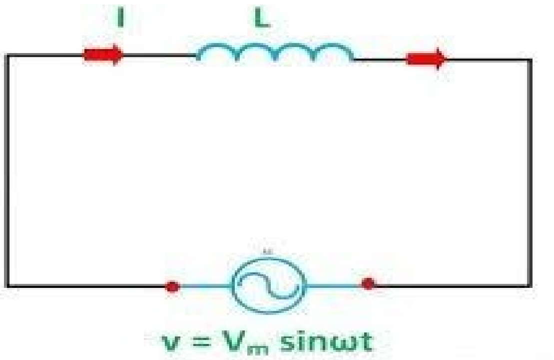

Fig. 4. Pure Inducuve AC circuit

In this circuit voltage source is connected across the pure Inductance, Due this instantaneous voltage source instantaneous current flowing through the circuit, due to this current voltage drop across inductance.

$V_L = I * X_L$

Fig.5. Phasor Representation

In pure Inductive ac circuit current lagging to voltage by an angle 90 degree.Means phase difference between voltage and current is -90.

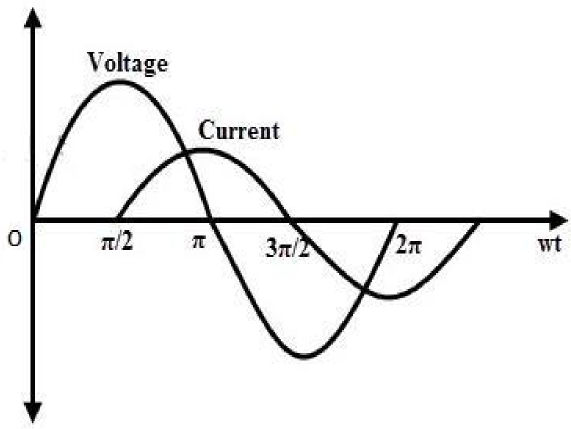

Fig. 6. Waveform

Voltage equation :
V= Vm sin(wt) Current equation:
I= Im sin(wt-90degree)

**C. Pure Capacitive Circuit**

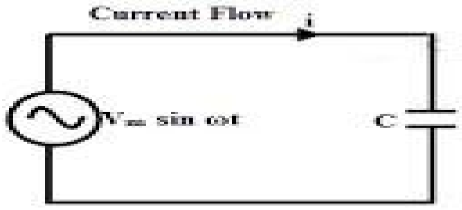

Fig. 7. Pure Capacitive AC Circuit

In this circuit voltage source is connected across the pure Capacitance, Due this instantaneous voltage source instantaneous current flowing through the circuit, due to this current voltage drop occur across capacitance.

$V_L = I * X_c$

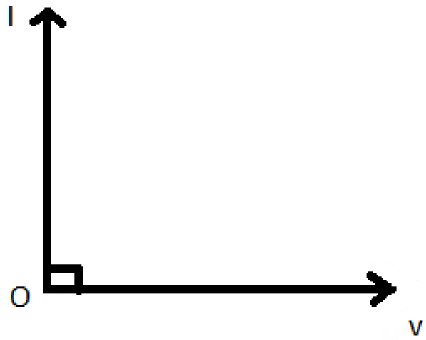

Fig. 8. . Phasor Representation

In pure capacitive ac circuit current leading to voltage by an angle 90 degree. Means phase difference between voltage and current is 90 degree.

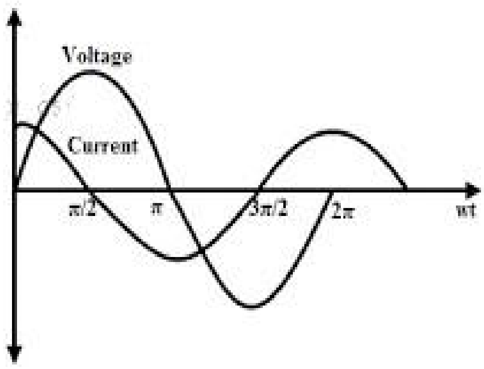

Fig. 9. Waveform

Voltage equation :
V= Vm sin(wt) Current equation:
I= Im sin(wt+ 90 degree)

III. EXPERIMENT AND RESULT

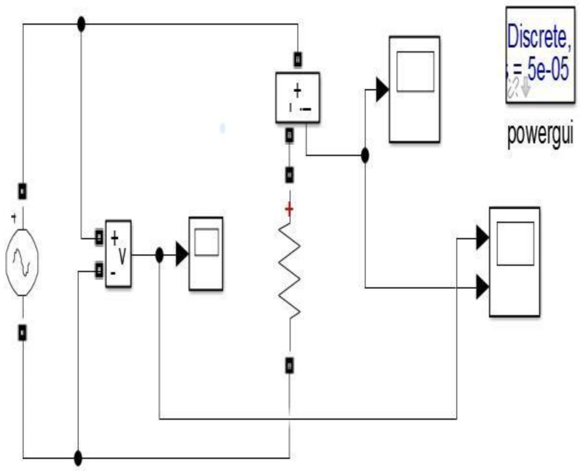


Fig. 10. Matlab model of pure resistive circuit

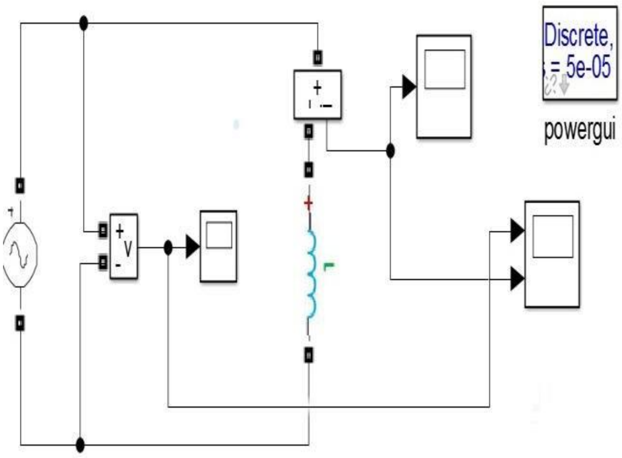


Fig. 11. Matlab model of pure Inductive circuit

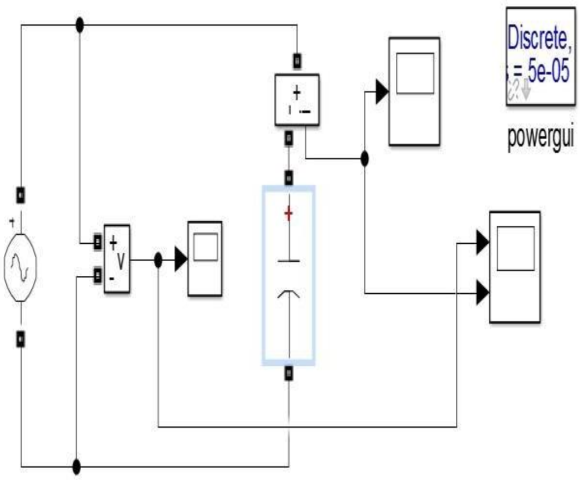


Fig. 11. Matlab model of pure Capacitive circuit

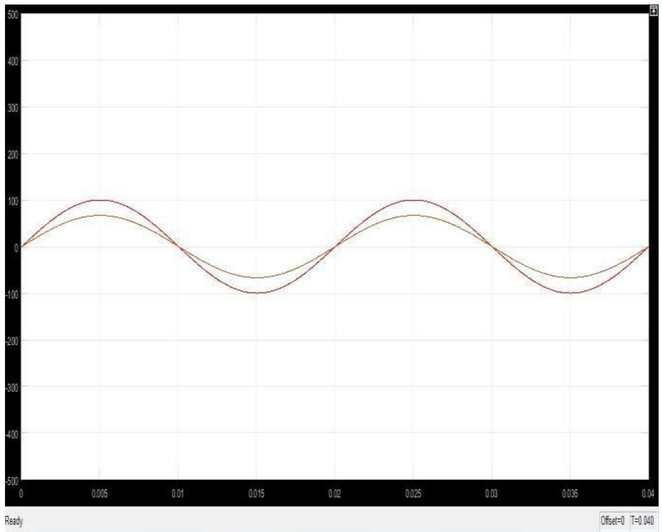

Fig. 12. Output response of matlab model of Pure Resistive circuit

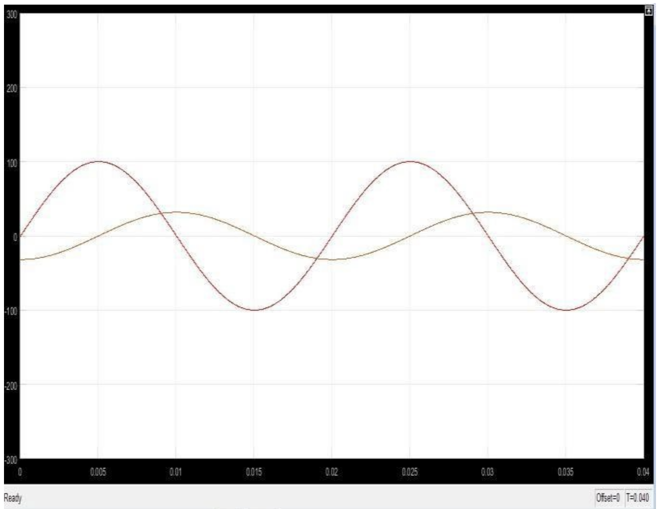

Fig. 13. Output response of matlab model of Pure Inductive circuit.

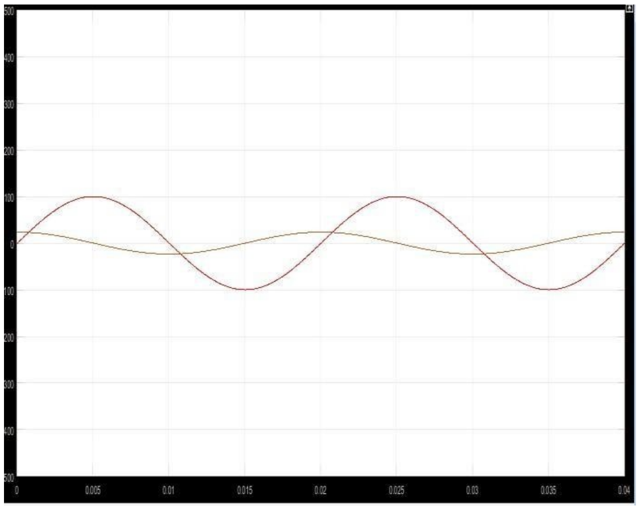

Fig. 14. Output response of matlab model of Pure Capacitive circuit.

## IV. CONCLUSION

We conclude from the response of simulink model of pure resistive, pure inductive, pure capacitive exactly match with theory concept of pure resistive, Inductive, Capacitive AC circuits.

## V. REFERENCE

[1]. B. H. Deshmukh “Basic Electrical Engineering” (90-158)
[2]. V. K. Mehta and Rohit Mehta S Chand publication “Objective Electrical Technology by”(25-45).
[3]. B.L. Theraja, A. K. Theraja “Electrical Technology, Volume 1” (50-75)
[4]. J.s.katre “Electrical Circuits” (20-145)
[5]. S. Rakesh Lecture notes on “Electrical circuit analysis “ 2020-21(05-21)
[6]. William Hayt, Jack E. Kemmerly, S M Durbin, Mc Graw Hill Companies ”Engineering Circuit Analysis”
[7]. Malla reddy college of engineering & technology “Electrical circuits” 2017-18 (69-122)
[8]. C. L. Wadhwa (2008), Electric Circuits Analysis, 2 nd edition,New Age International Publications, New Delhi.
[9]. A.Chakrabarthy(2010),CircuitTheory,5th edition, Dhanpat Rai & Sons Publications, New Delhi.
[10]. Pushpendra k jain “Series RLC circuit Revisited”June-2000
[11]. V.G. Yangalwar, K.P.Akole, Mrs. Vidya K. Khobare, Ganesh B. Akoliya “ Basic Electronics” Nrali publication 2018(1.1-1.15)
[12]. MATLAB 2016a used for Matlab simulation model.