

## Lab 12: Transient, AC and DC Sweep Analyses

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Objective:

- \* Transient, AC and DC Sweep Analysis
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### Lab12a:

1. Perform Transient Analysis on the circuit shown in Figure 12.1. Set VIN to be SIN wave of frequency 10K and amplitude of 10V, use a stop time of 500us.

To set up the analysis:

- (a) Click **Launch>ADE L**
- (b) Click **Analyses>Choose** or **Choose Analyses Icon**
- (c) In the Analysis Section, select **tran**
- (d) Set the Stop Time to **500u**.
- (e) Click **Enabled and OK**.
- (f) Click **Create>Pin** or **Create Pin Icon** to add input pin **VIN** (set direction in the dialog to **input**). Note: when creating output pin, change the direction in the dialog to be **output**.

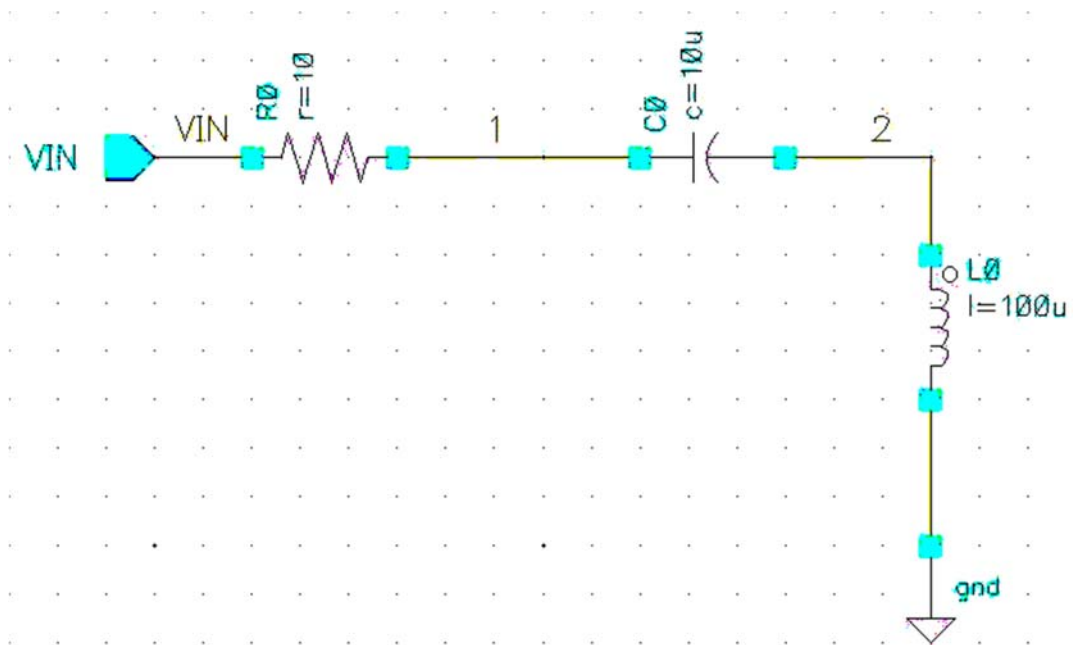


Figure 12.1 lab12a Circuit for Transient Analysis

2. To set up the forces for VIN:

- (a) Click **Setup > Stimuli**  
Click **Enabled**  
Function: **sin**  
Amplitude: **10**  
Frequency: **10K**

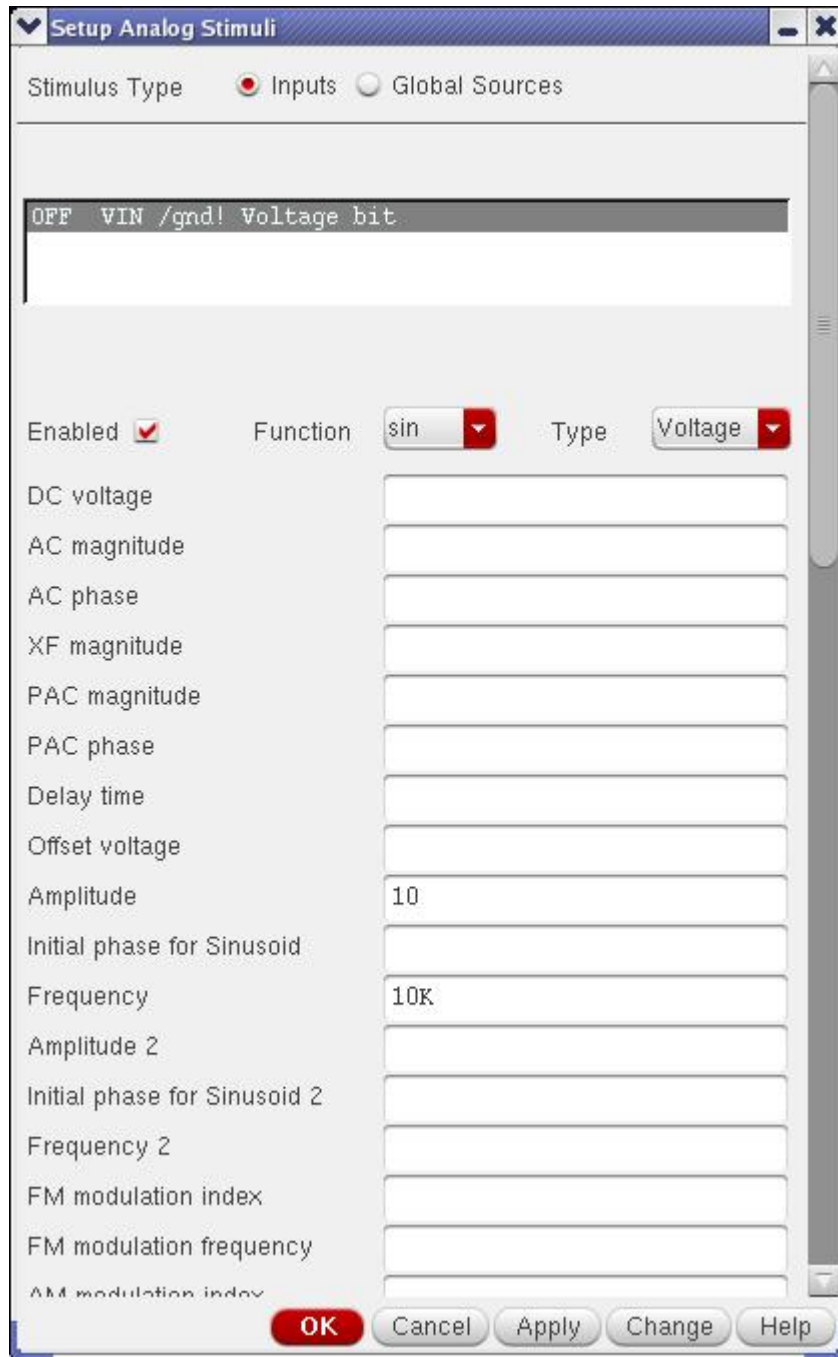


Figure 12.2 Setup Stimuli

3. To trace the waveforms of VIN, node 1 and node 2 voltages.
  - (a) Click **Outputs>To Be Plotted>Select On Schematic** or **Setup Outputs Icon**
  - (b) Select **VIN, 1 & 2** by clicking on the wire.
  - (c) Click **Simulation>Netlist & Run** or **Netlist and Run Icon**
  - (d) Click **OK**.
  - (e) To print waveform, click **File>Print**
  
4. From basic AC circuit theory, calculate the voltage at nodes 1 and 2. Compare the calculated values with the simulation results.

## Lab12b:

1. Perform an AC analysis on the lab8b circuit shown in Figure 12.3. (Note: You may save a copy of lab8a as lab8b and alter the values of the components). Perform AC analysis on this circuit. Set frequency range from 10Hz to 100KHz with AC Magnitude of 10V.

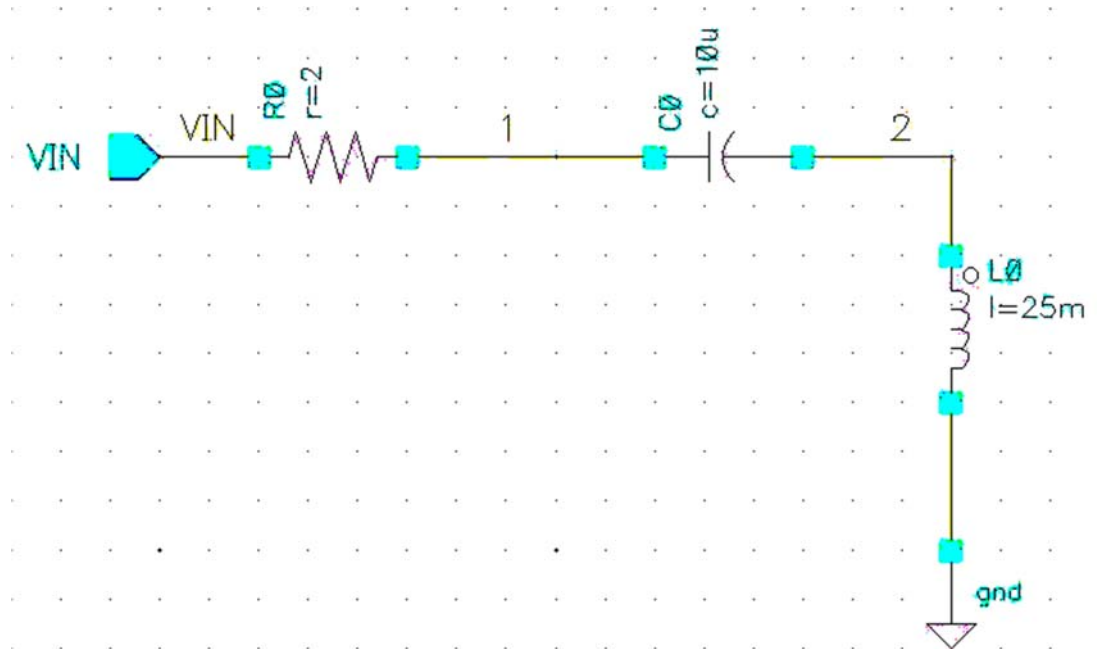


Figure 12.3 lab12b Circuit

2. To set up AC Analysis :
  - (a) Click **Launch>ADE L**
  - (b) Click **Analyses>Choose Analysis** or **Choose Analyses Icon**
  - (d) In the Analysis Section, select **ac**
  - (e) Set the Sweep Variable to **Frequency**
  - (f) Set the Sweep Range to **Start-Stop** (Start:10, Stop:100K)
  - (g) Set the Sweep Type to **Logarithmic**, Points per decade: **1000**
  - (h) Click **Enabled** and **OK**

- To set up VIN:  
Click **Setup>Stimuli**  
Click **Enabled**.  
Select function as **sin**  
**AC Magnitude: 10V**  
**AC Phase: 0**

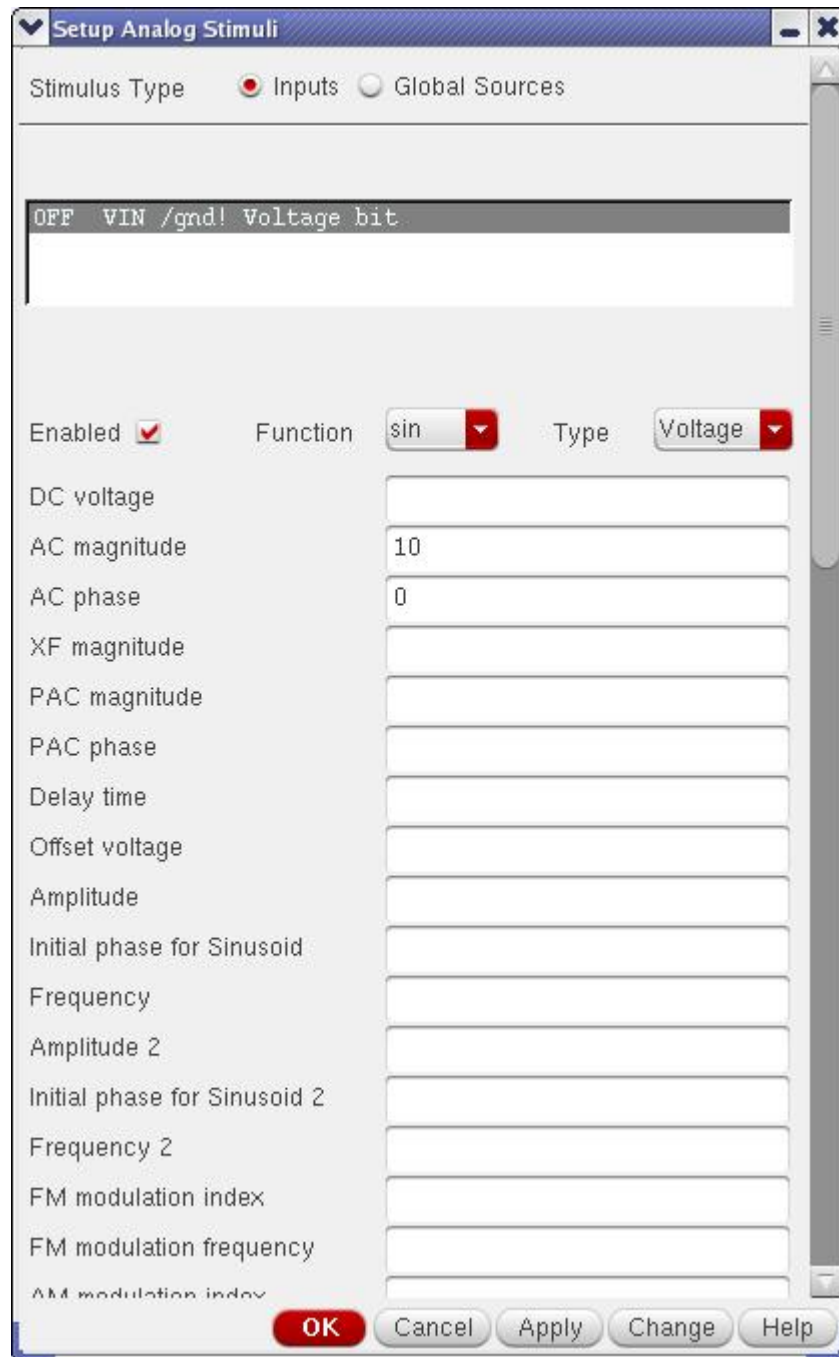


Fig 12.4 Setup Stimuli - VIN

- Plot waveform of **node 2** using **Outputs>To Be Plotted>Select On Schematic** or **Setup Outputs Icon**. From the waveform, deduce the **resonant frequency** and the peak **inductor voltage**.

### Lab12c:

1. Perform an AC analysis on the circuit show in Figure 12.5 to study the effect of frequency from 10Hz to 100KHz.

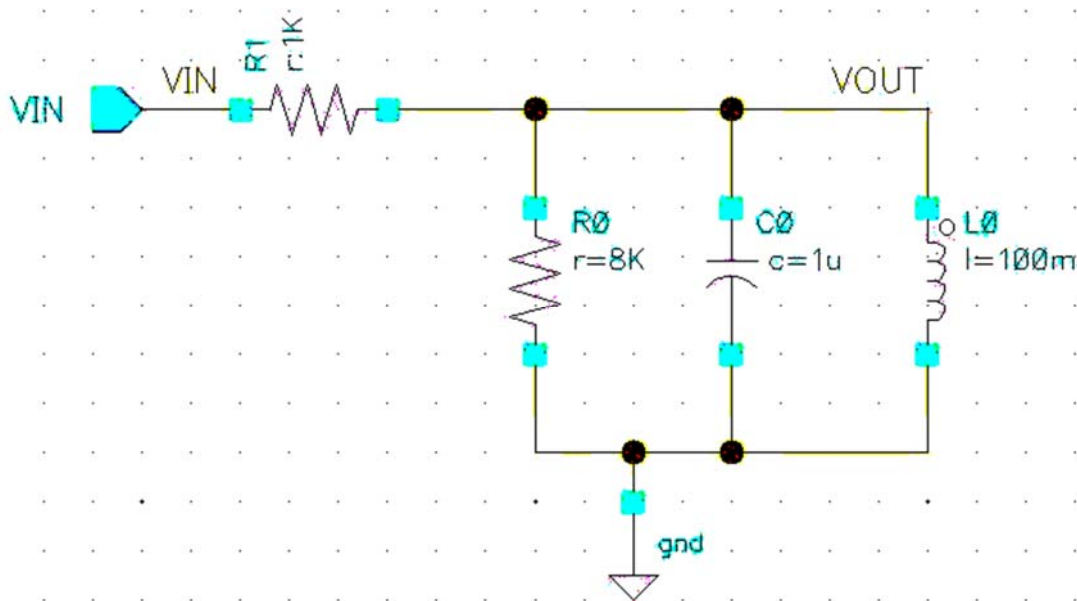


Figure 12.5 lab12c Circuit

2. Set up VIN according to the following:  
Click **Setup>Stimuli**  
Click **Enabled**.  
Select function as **sin**  
**AC Magnitude: 10V**  
**AC Phase: 0**
3. Plot waveform of VOUT using **Outputs>To Be Plotted>Select On Schematic** or **Setup Outputs Icon**.
4. From the waveform, deduce the **resonant frequency** and peak voltage of VOUT.

## Lab12d:

1. Perform a DC sweep analysis on the circuit shown in Figure 12.6.

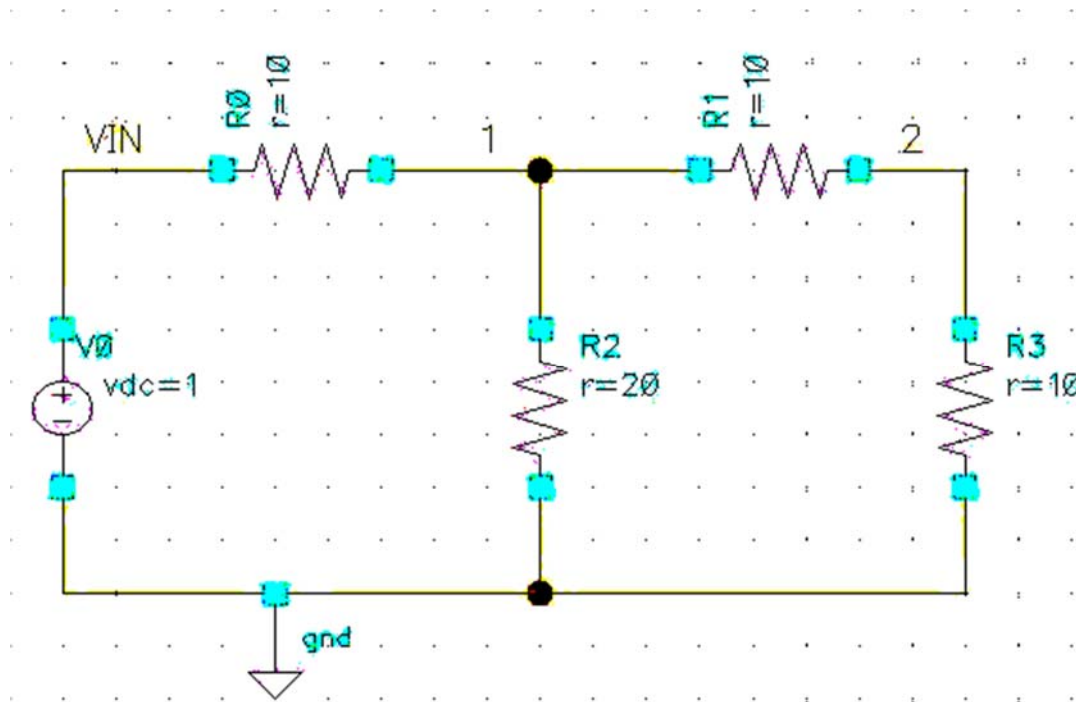


Figure 12.6 lab12d Circuit

2. To setup a DC sweep Analysis:
  - (a) In the Analysis Section, select **dc**.
  - (b) Click **Save DC Operating Point**.
  - (c) Set the Sweep Variable to **Component Parameter**.
  - (d) Click on **Select Component**. This allows us to select instance on the schematic.
  - (e) Click on the **supply source vdc** from schematic window.
  - (f) A form appears which list all the instances parameters. Select **dc** and Click **OK**.
  - (g) In the Sweep Range section, select **Start-Stop** (Start: **0** Stop: **10**).
  - (h) Click **Enabled** and **OK**.
3. Run the simulation and trace of waveform of  $V_{IN}$ , node 1 and 2.
  - (a) Click **Outputs>To Be Plotted>Select On Schematic** or **Setup Outputs Icon**
  - (b) Click on the wires to select  **$V_{in}$ , 1 and 2**.
  - (c) Click **Simulation>Netlist and Run** or **Netlist and Run Icon**. Click **OK**.
  - (d) Deducing nodes 1 and 2 voltages when  $V_{IN}$  is 5V.