**EE 205 Circuit Theory**

**Lab 9**

**Steady State Sinusoidal Response (Phasor Analysis)**

**Procedure:**

Consider the RC circuit shown in Fig.1 with C=1uF, R=10. Use a cos source signal with 10V peak and 0V offset at 100kHz frequency. We aim to find the steady state VC(t).



Fig.1. Steady State RC Circuit

The phasor impedance of the capacitor is

$$Z\_{C}=\frac{1}{jωC}=\frac{-j}{2π(10^{5})(10^{-7})}=\frac{-j100}{2π}≅-j16 Ω$$

Thus, the capacitor voltage phasor is

$$\overbar{V}\_{C}=10×\frac{-j16}{100-j16}≅0.25-1.6j≅1.58∠-1.4158≅1.58∠-81^{0}$$

 The time expression of the capacitor voltage is

$$V\_{C}\left(t\right)=Re\left\{\overbar{V}\_{C}e^{jωt}\right\}=1.58cos⁡(ωt-81^{0})$$

Table 1. Calculated and Measured Values

|  |  |
| --- | --- |
| Calculated Values for VC | Measured Values for VC |
| $Amplitude$ (V) | $Phase$ (degrees) | $Amplitude$ (V) | $Phase$ (degrees) |
|  |  |  |  |