

Dr Satvir Singh

LINEAR INTEGRATED CIRCUITS

3-07

Op-Amp Integrator & Differentiator Circuits

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Integrator Circuit

Since non-inverting terminal is grounded therefore, current through R is given as

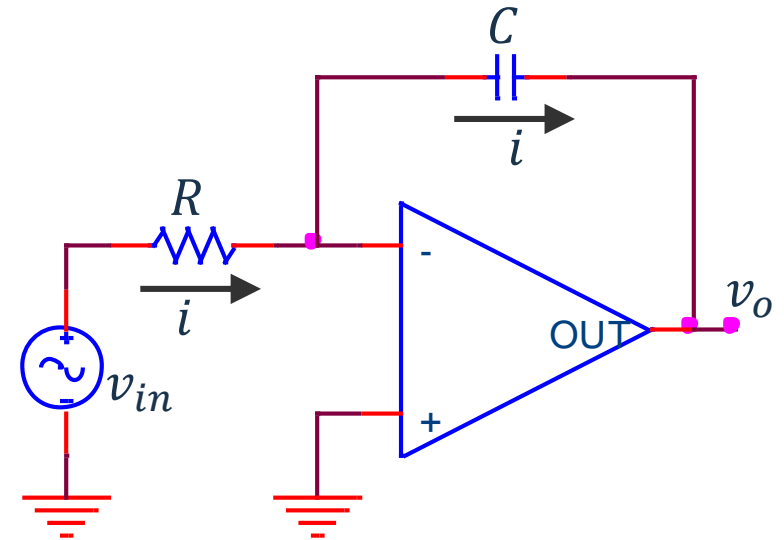
$$i = \frac{v_{in}}{R}$$

The output voltage across capacitor C is given by

$$v_o = -\frac{1}{C} \int i dt = -\frac{1}{C} \int \frac{v_{in}}{R} dt$$

$$v_o = -\frac{1}{RC} \int v_{in} dt$$

Note that output voltage is integration of the input voltage



Differentiator Circuit

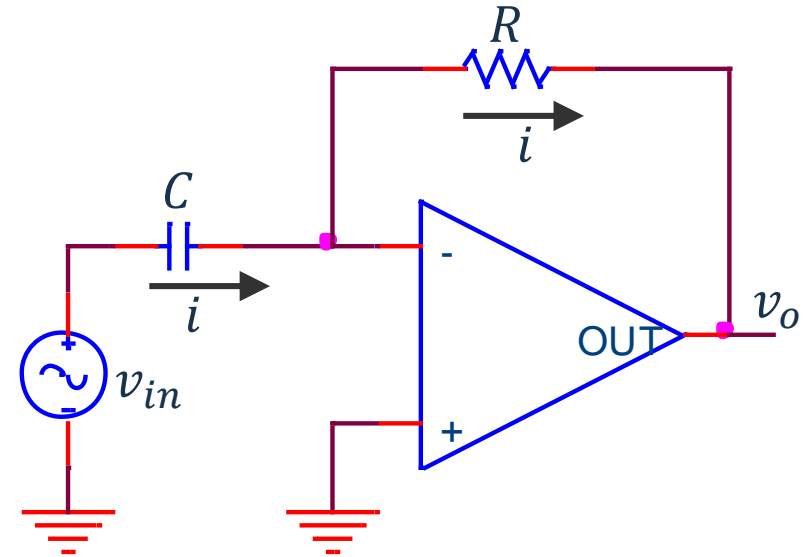
Places of resistance and capacitances are exchanged here. Accordingly, current through C is given as

$$i = C \frac{dv_{in}}{dt}$$

Same current flows through resistance R . The output voltage is given by

$$v_o = -iR = -RC \frac{dv_{in}}{dt}$$

Hence, the output voltage is differentiation of the input voltage



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Thank You

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