DIFFERENTIATOR USING OP-AMP
Differentiator

- The differentiator circuit is one in which the voltage output is directly proportional to the rate of change of the input voltage with respect to time.

This means that a fast change to the input voltage signal, the greater the output voltage change in response. As a differentiator circuit has an output that is proportional to the input change, some of the standard waveforms such as sine waves, square waves and ramp waves gives very different waveforms at the output of the differentiator circuit.
The Input sinusoidal voltage is applied across the Differentiating circuit. By differentiating the Sinusoidal voltage the differentiated waveform is obtained as Inverted sine wave on the output end.
Pulse Input
The Pulse Input voltage is applied across the Differentiating circuit. By differentiating the pulse voltage the differentiated waveform in the form of the positive and the negative spikes obtained on the output end.
Ramp Input
The Input Ramp voltage is applied across the Differentiating circuit. By differentiating the Ramp voltage, the differentiated waveform is obtained on the output end.
Conclusion

- The differentiator circuit has many applications in a number of areas of electronic design. The op amp differentiator is particularly easy to use and therefore is possibly one of the most widely used version.

- The circuit is used in analogue computers where it is able to provide a differentiation manipulation on the input analogue voltage.

- The voltage output for the op amp differentiator can be determined from the relationship below:

  \[ V_{\text{out}} = -RC \times \frac{dV_{\text{in}}}{dt} \]